SUBSECTION 8.1

Air Quality

8.1 Air Quality

The proposed San Francisco Electric Reliability Project (SFERP) consists of the installation and operation of three simple-cycle General Electric LM6000PC combustion turbines between 25th Street and Cesar Chavez Street at Michigan in the Potrero District of the City of San Francisco. The project will include one small two-cell cooling tower to provide inlet air chilling as necessary to maintain turbine output and auxiliary cooling as necessary. The nominal plant output will be 145 megawatts (MW).

This section of the Application for Certification (AFC) describes existing air quality conditions, maximum potential impacts from the project, and mitigation measures that keep these impacts below thresholds of significance. The project will use the latest, most efficient peaking generation technology to generate electricity in a manner that will minimize the amount of fuel needed, emissions of criteria pollutants, and potential effects on ambient air quality.

Other beneficial environmental aspects of the project that minimize adverse air quality include the following:

- Clean-burning natural gas as fuel
- Selective catalytic reduction (SCR) and combustion turbine water injection to minimize NO_x emissions
- Oxidation catalysts to reduce emissions of carbon monoxide and hazardous air pollutants
- Appropriately sized stacks to reduce ground-level concentrations of exhaust constituents

The SFERP will emit substantially less NO_x than existing in-City generation. In addition, the City has procured an option for local emission reduction credits to fully offset NO_x emissions from the SFERP. Although the modeling shows that the SFERP is not expected to contribute significantly to cumulative regional or localized air quality impacts of any pollutants, including NO_2 and PM_{10}, the City recognizes that there will be PM_{10} impacts from the SFERP in both Potrero and Bayview/Hunters Point. To address community concerns, the City is developing, with community input, a PM_{10} mitigation/community benefits package. The City will target the mitigation to the areas affected by the impacts from the project.

This section presents the methodology and results of the air quality analyses performed to assess potential impacts associated with air emissions from the project. Potential public health risks posed by emissions of non-criteria pollutants are also addressed in Subsection 8.6, Public Health.

Subsection 8.1.1 presents the air quality setting, including geography, topography, climate and meteorology. Subsection 8.1.2 provides an overview of air quality standards and health effects. Subsection 8.1.3 discusses the criteria pollutants and existing air quality in the vicinity of the proposed project. The affected environment is analyzed in Subsection 8.1.4, and air quality regulatory agencies relevant to the project are identified; the LORS that can affect the project and project conformance are also identified in Subsection 8.1.4. Subsection 8.1.5 discusses the environmental consequences of emissions from the project and presents an overview of approaches for estimating facility impacts, modeling, and analysis. The screening health risk assessment, visibility screening analysis, and construction impacts analysis are also discussed. Subsection 8.1.6 discusses compliance with LORS applicable to the project. Subsection 8.1.7 notes that a cumulative air quality impacts analysis is included as Appendix 8.1F. Mitigation for project air quality impacts is discussed in Subsection 8.1.8. A list of references used in preparing the section is provided in Subsection 8.1.9.

8.1.1 Air Quality Setting

8.1.1.1 Geography and Topography

The project will be located on the east side of the City of San Francisco, near the San Francisco Bay in the Potrero District, between 25th Street and Cesar Chavez Street at Michigan. The project site is at an elevation of approximately 14 feet above sea level. The nearest residences are located within approximately 1,600 feet west of the project site. San Francisco Bay lies immediately east of the site.

8.1.1.2 Climate and Meteorology

The overall climate at the project site is dominated by the semipermanent eastern Pacific high-pressure system centered off the coast of California. This high-pressure system is centered between the 140° west (W) and 150° W meridians, and oscillates in a north-south direction. Its position governs California's weather. In the summer, the high-pressure system moves to its northernmost position, which results in strong northwesterly flow and negligible precipitation. A thermal low-pressure area from the Sonoran–Mojave Desert also causes air to flow onshore over the San Francisco Bay area much of the summer.

In the winter, the high-pressure system moves southwestward toward Hawaii, which allows storms originating in the Gulf of Alaska to reach northern California, bringing wind and rain. About 80 percent of the region's annual rainfall of approximately 19.3 inches (City of San Francisco, 2005) occurs between November and March (U.S. Department of Commerce, Weather Bureau, 1959). During the winter rainy periods, inversions are weak or nonexistent, winds are often moderate, and the air pollution potential is very low. During summer and fall, when the Pacific high-pressure system becomes dominant, inversions become strong and often are surface-based; winds are light and the pollution potential is high. These periods are often characterized by winds that flow out of the Central Valley into the Bay Area and often include morning and evening fog.

Temperature, wind speed, and direction data have been recorded at a meteorological monitoring station at the nearby Potrero Power Plant (Potrero PP) at a station operated by PG&E in 1992. The average annual temperature is 62 degrees Fahrenheit (°F). The average July temperature is 64°F; winter temperatures average 56°F in January (City of San Francisco, 2005).

Air quality is determined primarily by the type and amount of pollutants emitted into the atmosphere, the topography of the air basin, and local meteorological conditions. In the project area, stable atmospheric conditions and light winds can provide conditions for pollutants to accumulate in the air basin when emissions are produced. The predominant winds in California are shown in Figures 8.1-1 through 8.1-4 (all figures are at the end of this subsection). As indicated in the figures, winds in California generally are light and easterly in the winter, but strong and westerly in the spring, summer, and fall.

Wind patterns at the project site can be seen in Figures 8.1-5a through 8.1-5e, which show annual and quarterly wind roses for meteorological data collected at the Potrero PP meteorological station during 1992. Wind frequency distribution tables are provided in Appendix 8.1B. These wind roses show that the winds are persistent (less than 1 percent calm conditions) and on an annual basis, predominantly from the west through the west-southwest (almost half the time). Winds are predominantly from the north and south during the winter months. The mixing heights of the area are affected by the eastern Pacific high-pressure system and marine influences. Often, the base of the inversion is found at the top of a layer of marine air, because of the cooler nature of the marine environment. Smith et al., (1984) reported that at Oakland, the nearest upper-level meteorological station (located approximately 10 miles east-southeast of the project site), 50th percentile morning mixing heights for the period 1979-1980 were on the order of 1,770 feet (530 to 550 meters) in summer and fall, and 3,600 to 3,900 feet (1,100 to 1,200 meters) in winter and spring. The 50th percentile afternoon mixing heights ranged from 2,150 and 3,030 feet (660 to 925 meters) in summer and fall, and over 3,900 feet (over 1,200 meters) in winter and spring. Such mixing heights provide generally favorable conditions for the dispersion of pollutants. Inland areas, where the marine influence is weaker, often experience strong ground-based inversions during cold weather periods. These inversions inhibit dispersion of low-lying sources of air pollution, such as cars, trucks, and buses, and can result in high pollutant concentrations.

8.1.2 Overview of Air Quality Standards

The U.S. Environmental Protection Agency (USEPA) has established national ambient air quality standards (NAAQS) for ozone, nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter with aerodynamic diameter less than or equal to 10 microns (PM_{10}), particulate matter with aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$), and airborne lead. Areas with air pollution levels above these standards are considered “nonattainment areas” subject to planning and pollution control requirements that are more stringent than standard requirements.

In addition, the California Air Resources Board (CARB) has established standards for ozone, CO, NO_2, SO_2, sulfates, PM_{10}, airborne lead, hydrogen sulfide, and vinyl chloride at levels designed to protect the most sensitive members of the population, particularly children, the elderly, and people who suffer from lung or heart diseases.

Both state and national air quality standards consist of two parts: an allowable concentration of a pollutant, and an averaging time over which the concentration is to be measured. Allowable concentrations are based on the results of studies of the effects of the pollutants on human health, crops and vegetation, and, in some cases, damage to paint and other materials. The averaging times are based on whether the damage caused by the pollutant is more likely to occur during exposures to a high concentration for a short time (1 hour, for instance), or to a relatively lower average concentration over a longer period (8 hours, 24 hours, or 1 month). For some pollutants there is more than one air quality standard, reflecting both short-term and long-term effects. Table 8.1-1 presents the NAAQS and California ambient air quality standards for selected pollutants. The California standards are generally set at concentrations much lower than the federal standards, and in some cases have shorter averaging periods.

USEPA's new NAAQS for ozone and fine particulate matter went into effect on September 16, 1997. For ozone, the previous 1-hour standard of 0.12 parts per million (ppm) was replaced by an 8-hour average standard at a level of 0.08 ppm. Compliance with this standard will be based on the 3-year average of the annual fourth-highest daily maximum 8-hour average concentration measured at each monitor within an area.

TABLE 8.1-1
Ambient Air Quality Standards

Pollutant	Averaging Time	California	National
Ozone	1 hour	0.09 ppm	0.12 ppm
	8 hours	–	0.08 ppm (3-year average of annual fourth-highest daily maximum)
Carbon Monoxide	8 hours	9.0 ppm	9 ppm
	1 hour	20 ppm	35 ppm
Nitrogen Dioxide	Annual Average	–	0.053 ppm
	1 hour	0.25 ppm	–
Sulfur Dioxide	Annual Average	–	80 $\mu g/m^3$ (0.03 ppm)
	24 hours	0.04 ppm (105 $\mu g/m^3$)	365 $\mu g/m^3$ (0.14 ppm)
	3 hours	–	1,300* $\mu g/m^3$ (0.5 ppm)
	1 hour	0.25 ppm	–
Suspended Particulate Matter (10 micron)	Annual Arithmetic Mean	20 $\mu g/m^3$	50 $\mu g/m^3$
	24 hours	50 $\mu g/m^3$	150 $\mu g/m^3$
Suspended Particulate Matter (2.5 micron)	Annual Arithmetic Mean	12 $\mu g/m^3$	15 $\mu g/m^3$ (3-year average)
	24 hours	–	65 $\mu\mu/m^3$ (3-year average of 98th percentiles)
Sulfates	24 hours	25 $\mu g/m^3$	–
Lead	30 days	1.5 $\mu g/m^3$	–
	Calendar Quarter	–	1.5 $\mu g/m^3$
Hydrogen Sulfide	1-hour	0.03 ppm	–
Vinyl Chloride	24-hour	0.010 ppm	–
Visibility Reducing Particles	8-hour (10 am to 6 pm PST)	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.	–

* This is a national secondary standard, which is designed to protect public welfare.

The NAAQS for particulates were revised in several respects. First, compliance with the current 24-hour PM_{10} standard will now be based on the 99th percentile of 24-hour concentrations at each monitor within an area. Two new $PM_{2.5}$ standards were added: a standard of 15 microgram per cubic meter ($\mu g/m^3$), based on the 3-year average of annual arithmetic means from single or multiple monitors (as available); and a standard of 65 $\mu g/m^3$, based on the 3-year average of the 98th percentile of 24-hour average concentrations at each monitor within an area. Finally, the state adopted a new, lower annual PM_{10} standard of 20 $\mu g/m^3$.

8.1.3 Existing Air Quality

To characterize existing air quality at the project site, ambient air quality readings were taken from a nearby air monitoring station on Arkansas Street, San Francisco. The station, which is less than 2 miles northwest of the project site, is operated by the Bay Area Air Quality Management District (BAAQMD). This station was used because of its proximity to the project site and because it records area-wide ambient conditions rather than the localized impacts of any particular facility. (A more extensive discussion of why the data from these stations are considered to be representative of air quality in the vicinity of the proposed project is provided in Subsection 8.1.5.3.1.) All ambient air quality data presented in this section were taken from CARB and USEPA publications and data sources. Although ambient data is being collected at the Bayview Hunters Point Community Air Monitoring Project (BayCAMP) monitoring station south of the proposed plant site, less than a full year of data is available from that site and so that data cannot be used to draw conclusions regarding long-term air quality trends in the area. A comparison of readings at Hunters Point and Arkansas Street is provided later in this subsection, in Table 8.1-24.

8.1.3.1 Ozone

Ozone is generated by a complex series of chemical reactions between precursor organic compounds (POC) and oxides of nitrogen (NO_x) in the presence of ultraviolet radiation. Ambient ozone concentrations follow a seasonal pattern: higher in the summertime and lower in the wintertime. At certain times, the general area can provide ideal conditions for the formation of ozone due to the persistent temperature inversions, clear skies, mountain ranges that trap the air mass, and exhaust emissions from millions of vehicles and stationary sources. Based upon ambient air measurements at stations throughout the area, the Bay Area Air Basin is classified as a nonattainment area for ozone.

Maximum ozone concentrations at the San Francisco station usually are recorded during the summer months. Table 8.1-2 shows the annual maximum hourly ozone levels recorded at the Arkansas Street monitoring station during the period 1994–2003, as well as the number of days in which the state and federal standards were exceeded. (Complete data for 2004 from the Arkansas Street station is not yet available.)

The long-term trends of maximum 1-hour ozone readings and violations of the state and federal standard are shown in Figure 8.1-6 for the Arkansas Street monitoring station. The data show that, on average, the state and federal ozone air quality standards have not been exceeded in the area in the past 10 years. Trends of maximum and 3-year average of the fourth highest daily concentrations of 8-hour average ozone readings and exceedances of the federal standard are shown in Figure 8.1-7. These levels are well below the federal

8-hour average standard. USEPA has proposed to redesignate the BAAQMD to an attainment area for the 1-hour federal standard; CARB has requested an initial designation of attainment for the BAAQMD for the 8-hour federal standard.

TABLE 8.1-2
Ozone Levels in San Francisco, Arkansas Street Monitoring Station, 1994-2003 (ppm)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Highest 1-Hour Average	0.055	0.009	0.071	0.068	0.053	0.079	0.058	0.082	0.054	0.085
Highest 8-Hour Average	0.045	0.067	0.050	0.059	0.046	0.057	0.043	0.054	0.049	0.059
Number of Days Exceeding:										
State Standard (0.09 ppm, 1-hour)	0	0	0	0	0	0	0	0	0	0
Federal Standard (0.12 ppm, 1-hour)	0	0	0	0	0	0	0	0	0	0
Federal Standard (0.08 ppm, 8-hour)	0	0	0	0	0	0	0	0	0	0

Source: California Air Quality Data, California Air Resources Board (CARB, 2005).

8.1.3.2 Nitrogen Dioxide

Atmospheric NO_2 is formed primarily from reactions between nitric oxide (NO) and oxygen or ozone. NO is formed during high-temperature combustion processes, when the nitrogen and oxygen in the combustion air combine. Although NO is much less harmful than NO_2, it can be converted to NO_2 in the atmosphere within a matter of hours, or even minutes, under certain conditions. For purposes of state and federal air quality planning, the BAAQMD is in attainment for NO_2.

Table 8.1-3 shows the long-term trend of maximum 1-hour NO_2 levels recorded at Arkansas Street, as well as the annual average level for each of those years. During this period there has not been a single violation of either the state 1-hour standard or the NAAQS of 0.053 ppm.

TABLE 8.1-3
Nitrogen Dioxide Levels in San Francisco, Arkansas Street Monitoring Station, 1994-2003 (ppm)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Highest 1-Hour Average	0.091	0.088	0.081	0.067	0.080	0.103	0.074	0.073	0.075	0.072
Annual Average (NAAQS = 0.053 ppm)	0.022	0.021	0.021	0.020	0.020	0.021	0.020	0.019	0.019	0.018
Number of Days Exceeding:										
State Standard (0.25 ppm, 1-hour)	0	0	0	0	0	0	0	0	0	0
Federal Standard (0.053 ppm, annual arithmetic mean)	0	0	0	0	0	0	0	0	0	0

Source: California Air Quality Data, California Air Resources Board (CARB, 2005).

Figure 8.1-8 shows the historical trend of maximum 1-hour NO_2 levels at Arkansas Street. The NO_2 levels are approximately one-third of the state standard.

8.1.3.3 Carbon Monoxide

CO is a product of inefficient combustion, principally from automobiles and other mobile sources of pollution. In many areas of California, CO emissions from wood-burning stoves and fireplaces can also be measurable contributors to ambient CO levels. Industrial sources typically contribute less than 10 percent of ambient CO levels. Peak CO levels occur typically during winter months, due to a combination of higher emission rates and calm weather conditions with strong, ground-based inversions. Based upon ambient air quality monitoring, the Bay Area Air Basin is classified as being in attainment for CO.

Table 8.1-4 shows the California and federal air quality standards for CO, and the maximum 1- and 8-hour average levels recorded at the Arkansas Street monitoring station during the period 1994–2003.

TABLE 8.1-4
Carbon Monoxide Levels in San Francisco, Arkansas Street Monitoring Station, 1994–2003 (ppm)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Highest 1-hour average	5.8	5.3	5.4	4.8	7.1	5.4	5.5	4.0	3.5	3.6
Highest 8-hour average	4.40	4.44	3.8	3.45	3.96	3.68	3.19	3.28	2.57	2.84
Number of days exceeding:										
State Standard (20 ppm, 1-hr)	0	0	0	0	0	0	0	0	0	0
State Standard (9.0 ppm, 8-hr)	0	0	0	0	0	0	0	0	0	0
Federal Standard (9.3 ppm, 8-hr)	0	0	0	0	0	0	0	0	0	0

Source: California Air Quality Data, California Air Resources Board (CARB, 2005); USEPA AirData (USEPA, 2005).

Trends of maximum 1- and 8-hour average CO concentrations are shown in Figures 8.1-9 and 8.1-10, which show that maximum ambient CO levels at Arkansas Street have been well below the state standards for many years.

8.1.3.4 Sulfur Dioxide

SO_2 is produced when any sulfur-containing fuel is burned. It is also emitted by chemical plants that treat or refine sulfur or sulfur-containing chemicals. Natural gas contains negligible sulfur, while fuel oils contain larger amounts. Peak concentrations of SO_2 occur at different times of the year in different parts of California, depending on local fuel characteristics, weather, and topography. The Bay Area Air Basin is considered to be in attainment for SO_2 for purposes of state and federal air quality planning.

Table 8.1-5 presents the state air quality standard for SO_2 and the maximum levels recorded from 1994 through 2003 in San Francisco. The federal 1-hour average standard is 0.25 ppm; during the period shown, the average SO_2 levels measured at the Arkansas Street station have been approximately one-tenth of the federal standard. Figure 8.1-11 shows that for several years the maximum 1-hour SO_2 levels typically have been less than approximately one-fifth of the state standard.

TABLE 8.1-5
Sulfur Dioxide Levels in San Francisco, Arkansas Street Monitoring Station, 1994–2003 (ppm)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Highest 1-Hour Average	0.017	0.044	0.036	0.026	0.036	0.028	0.019	0.025	0.053	0.024
Highest 24-Hour Average	0.006	0.007	0.008	0.007	0.005	0.007	0.008	0.008	0.007	0.007
Annual Average	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002
Number of Days Exceeding:										
State Standard (0.04 ppm, 24-hr)	0	0	0	0	0	0	0	0	0	0
Federal Standard (0.14 ppm, 24-hr)	0	0	0	0	0	0	0	0	0	0

Source: California Air Quality Data, California Air Resources Board (CARB, 2005); USEPA AirData (USEPA, 2005).

8.1.3.5 Particulate Sulfates

Particulate sulfates are the product of further oxidation of SO_2. The BAAQMD is in attainment of the state standard for sulfates. There is no federal standard for sulfates.

Table 8.1-6 shows the California air quality standard for particulate sulfate and the maximum 24-hour average levels recorded at Arkansas Street from 1994 through 2003. The trend of maximum 24-hour average sulfates over this period is plotted in Figure 8.1-12. Monitored concentrations have been well below half the state standard during this period.

TABLE 8.1-6
PM_{10} Sulfate Levels in San Francisco, Arkansas Street Monitoring Station, 1994–2003 ($\mu g/m^3$)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Highest 24-Hour Average	12.3	6.0	7.5	5.6	3.3	9.7	4.2	15.7	4.8	6.4
Number of Days Exceeding:										
State Standard (25 $\mu g/m^3$, 24-hr)	0	0	0	0	0	0	0	0	0	0

Source: California Air Quality Data, California Air Resources Board (CARB, 2005); USEPA AirData (USEPA, 2005).

8.1.3.6 Particulate Matter (PM_{10})

Particulates in the air are caused by a combination of wind-blown fugitive dust; particles emitted from combustion sources and manufacturing processes; and organic, sulfate, and nitrate aerosols formed in the air from emitted hydrocarbons, sulfur oxides, and nitrogen oxides. In 1984, CARB adopted standards for PM_{10} and phased out the total suspended particulate (TSP) standards that had been in effect previously. PM_{10} standards were substituted for TSP standards because PM_{10} corresponds to the size range of particulates that can be inhaled into the lungs and therefore is a better measure to use in assessing potential health effects. In 1987, USEPA also replaced national TSP standards with PM_{10} standards. The San Francisco Bay Area Air Basin is in attainment of the federal PM_{10} standards but exceeds the state standards.

Table 8.1-7 shows the federal and state air quality standards for PM_{10}, maximum levels recorded at the Arkansas Street monitoring station during 1994–2003, and geometric and arithmetic annual averages for the same period. The maximum 24-hour PM_{10} levels exceed the state standard, and the federal standard has not been exceeded during the past 10 years. The annual average PM_{10} levels have remained below the federal standards throughout the 10-year period.

TABLE 8.1-7
PM_{10} Levels in San Francisco, Arkansas Street Monitoring Station, 1994–2003 (ppm)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Highest 24-Hour Average	93	50	71	81	52	78	63	67	74	51
Annual Arithmetic Mean (State Standard = 20 $\mu g/m^3$)[a]	24.7	22.1	21.4	22.4	20.2	22.6	21.6	22.8	21.0	22.7
(Federal Standard = 50 $\mu g/m^3$)	28.6	24.8	24.3	24.9	22.1	26.4	24.3	26.3	24.7	21.8
Number of Days Exceeding:										
State Standard (50 $\mu g/m^3$, 24-hour)	34	0	12	14	6	36	12	42	12	6
Federal Standard (150 $\mu g/m^3$, 24-hour)	0	0	0	0	0	0	0	0	0	0

Source: California Air Quality Data, California Air Resources Board (CARB, 2005); USEPA AirData (USEPA, 2005).
[a] State annual standard was recently changed from 30 $\mu g/m^3$ to 20 $\mu g/m^3$.

The trend of maximum 24-hour average PM_{10} levels is plotted in Figure 8.1-13, and the trend of expected violations of the state 24-hour standard of 50 $\mu g/m^3$ is plotted in Figure 8.1-14. Note that since PM_{10} is measured only once every six days, expected violation days are six times the number of measured violations. The trend of maximum annual average PM_{10} readings and the California and federal standards are shown in Figure 8.1-15. Annual average PM_{10} concentrations are well below the federal standard, but remain slightly above the new state standard of 20 $\mu g/m^3$.

8.1.3.7 Fine Particulate Matter ($PM_{2.5}$)

As discussed previously, the NAAQS for particulates were further revised by USEPA with new standards that went into effect on September 16, 1997; two new $PM_{2.5}$ standards were added at that time. In June 2002, CARB established a new annual standard for $PM_{2.5}$. $PM_{2.5}$ data have been collected at the Arkansas Street monitoring station since 1999, and are presented here.

Table 8.1-8 shows the state and federal air quality standards for $PM_{2.5}$, maximum levels recorded at the Arkansas Street monitoring station 1999–2003, and 3-year averages for the same period. The 24-hour average concentrations have exceeded the standard occasionally throughout the monitoring period; however, there are not enough data available to draw any conclusions regarding trends in the 3-year average of 98th percentile values. Annual average $PM_{2.5}$ levels have also occasionally exceeded the standard. The Bay Area Air Basin is considered a nonattainment area for the state $PM_{2.5}$ standard, but is unclassified in relation to the federal standard.

TABLE 8.1-8
$PM_{2.5}$ Levels in San Francisco, Arkansas Street Monitoring Station, 1994–2003 (ppm)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Highest 24-Hour Average	–	–	–	–	–	71.2	47.9	76.6	70.2	41.6
Number of Days Exceeding:										
Federal Standard ($65\ \mu g/m^3$, 24-hour)	–	–	–	–	–	1	0	2	4	0
98th Percentile	–	–	–	–	–	47.4	35.3	51.3	57.5	33.0
3-yr Average, 98th Percentile	–	–	–	–	–	–	–	–	–	47
Annual Arithmetic Mean	–	–	–	–	–	12.6	11.4	11.5	13.1	10.1
3-yr Annual Average (Federal Std = $15\mu g/m^3$)	–	–	–	–	–	–	–	11.8	12.0	11.6

Source: California Air Quality Data, California Air Resources Board (CARB, 2005); USEPA AirData (USEPA, 2005).

The trend of the 98th percentile of the 24-hour average $PM_{2.5}$ levels is plotted in Figure 8.1-16.

8.1.3.8 Airborne Lead

The majority of lead in the air results from the combustion of fuels that contain lead. Twenty-five years ago, motor gasolines contained relatively large amounts of lead compounds used as octane-rating improvers, and ambient lead levels were relatively high. Beginning with the 1975 model year, new automobiles began to be equipped with exhaust catalysts, which were poisoned by the exhaust products of leaded gasoline. Thus, unleaded gasoline became the required fuel for an increasing fraction of new vehicles, and the phaseout of leaded gasoline began. As a result, ambient lead levels decreased dramatically. The Bay Area Air Basin has been in attainment of state and federal airborne lead levels for air quality planning purposes for a number of years.

The ambient lead levels are also monitored at Arkansas Street. Table 8.1-9 lists the federal air quality standard for airborne lead and the levels reported in San Francisco between 1994 and 2003. Maximum quarterly levels are well below the federal standard. (CARB no longer reports summary lead statistics on its website.)

TABLE 8.1-9
Airborne Lead Levels at San Francisco, Arkansas Street Monitoring Station, 1994-2003 (ppm)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Highest Quarterly Average	0.02	0.03	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01
Number of Days Exceeding:										
Federal Standard ($1.5\ \mu g/m^3$, quarterly)	0	0	0	0	0	0	0	0	0	0

Source: USEPA AirData (USEPA, 2005).

8.1.4 Affected Environment

The USEPA has responsibility for enforcing, on a national basis, the requirements of many of the country's environmental and hazardous waste laws. California is under the jurisdiction of USEPA Region IX, which has its offices in San Francisco. Region IX is responsible for the local administration of USEPA programs for California, Arizona, Nevada, Hawaii, and certain Pacific trust territories. USEPA's activities relative to the California air pollution control program focus principally on reviewing California's submittals for the State Implementation Plan (SIP). The SIP is required by the federal Clean Air Act (CAA) to demonstrate how all areas of the state will meet the national ambient air quality standards within the federally specified deadlines (42 USC §7409, 7411).

CARB was created in 1968 by the Mulford-Carrell Air Resources Act, through the merger of two other state agencies. CARB's primary responsibilities are to develop, adopt, implement, and enforce the state's motor vehicle pollution control program; to administer and coordinate the state's air pollution research program; to adopt and update as necessary the state's ambient air quality standards; to review the operations of the local air pollution control districts; and to review and coordinate preparation of the SIP for achievement of the federal ambient air quality standards (California Health & Safety Code [H&SC] §39500 et seq.).

When the state's air pollution statutes were reorganized in the mid-1960s, local air pollution control districts (APCDs) were required to be established in each county of the state (H&SC §4000 et seq.). There are three different types of districts: county, regional, and unified. In addition, special air quality management districts (AQMDs), with more comprehensive authority over non-vehicular sources as well as transportation and other regional planning responsibilities, have been established by the Legislature for several regions in California, including the San Francisco Bay Area (H&SC §40200 et seq.).

APCDs and AQMDs in California have principal responsibility for:

- Developing plans for meeting the state and federal ambient air quality standard
- Developing control measures for nonvehicular sources of air pollution necessary to achieve and maintain both state and federal air quality standards
- Implementing permit programs established for the construction, modification, and operation of sources of air pollution
- Enforcing air pollution statutes and regulations governing nonvehicular sources
- Developing employer-based trip reduction programs

Each level of government has adopted specific regulations that limit emissions from stationary combustion sources, several of which are applicable to this project. The other air agencies having permitting authority for this project are shown in Table 8.1-10. The applicable federal laws, ordinances, regulations and standards (LORS) and compliance with these requirements are discussed in more detail in the following sections. An application for a Determination of Compliance will be filed with the BAAQMD at approximately the same time as the Supplement to the AFC is filed with the California Energy Commission (CEC).

TABLE 8.1-10
Air Quality Agencies

Agency	Authority	Contact
USEPA Region IX	Oversight of permit issuance, enforcement	Gerardo Rios, Chief Permits Office USEPA Region IX 75 Hawthorne Street San Francisco, CA 94105 (415) 744-1259
California Air Resources Board	Regulatory oversight	Mike Tollstrup, Chief Project Assessment Branch California Air Resources Board 2020 L Street Sacramento, CA 95814 (916) 322-6026
Bay Area Air Quality Management District	Permit issuance, enforcement	Brian Bateman, Director Engineering Division Bay Area Air Quality Management District 939 Ellis Street San Francisco, CA 94109 (415) 749-4653

8.1.4.1 Laws, Ordinances, Regulations, and Standards

8.1.4.1.1 Federal

Prevention of Significant Deterioration Program

Authority: CAA §160-169A, 42 USC §7470-7491; 40 CFR Parts 51 and 52.

Requirements: Requires prevention of significant deterioration (PSD) review and facility permitting for construction of new or modified major stationary sources of air pollution. PSD review applies with respect to attainment pollutants for which ambient concentrations are lower than the corresponding national ambient air quality standards (NAAQS). The following federal requirements apply on a pollutant-by-pollutant basis, depending on facility emission rates.

- Emissions must be controlled using Best Available Control Technology (BACT).
- Air quality impacts in combination with other increment-consuming sources must not exceed maximum allowable incremental increases for SO_2, PM_{10}, and NO_x.
- Air quality impacts of all sources in the area plus ambient pollutant background levels cannot exceed NAAQS.
- Pre- and/or post-construction air quality monitoring may be required.
- The air quality impacts on soils, vegetation, and nearby PSD Class I areas (specific national parks and wilderness areas) must be evaluated. (Note: The SFERP is located in a Class II area.)

PSD review jurisdiction had been delegated to the BAAQMD for all pollutants; however, the delegation was rescinded in March 2003 and PSD permits for BAAQMD major sources are now issued by USEPA Region IX. Since the proposed project is not subject to PSD review, the applicant will not need to seek a separate permit from USEPA.

Administering Agency: USEPA Region IX.

New Source Review
Authority: CAA §171-193, 42 USC §7501 et seq.; 40 CFR Parts 51 and 52.

Requirement: Requires new source review (NSR) facility permitting for construction or modification of specified stationary sources. New source review applies with respect to nonattainment pollutants for which ambient concentration levels are higher than the corresponding NAAQS. The following federal requirements apply on a pollutant-by-pollutant basis, depending on facility emission rates.

- Emissions must be controlled to the lowest achievable emission rate (LAER).
- Sufficient offsetting emissions reductions must be obtained following the requirements in the regulations to continue reasonable further progress toward attainment of applicable NAAQS.
- The owner or operator of the new facility must demonstrate that major stationary sources owned or operated by the same entity in California are in compliance or on schedule for compliance with applicable emissions limitations in this rule.
- The administrator must find that the implementation plan has been adequately implemented.
- An analysis of alternatives must show that the benefits of the proposed source significantly outweigh any environmental and social costs.

New source review jurisdiction has been delegated to the BAAQMD for all pollutants and is discussed further under local LORS and conformance.

Administering Agency: BAAQMD, with USEPA Region IX oversight.

Acid Rain Program
Authority: CAA §401 (Title IV), 42 USC §7651

Requirement: Requires the reduction of the adverse effects of acid deposition through reductions in emissions of sulfur dioxide and nitrogen oxides. BAAQMD has received delegation authority to implement Title IV.

Administering Agency: BAAQMD, with USEPA Region IX oversight.

Title V Operating Permits Program
Authority: CAA §501 (Title V), 42 USC §7661.

Requirements: Establishes comprehensive operating permit program for major stationary sources. BAAQMD has received delegation authority for this program.

Administering Agency: BAAQMD, with USEPA Region IX oversight.

National Standards of Performance for New Stationary Sources
Authority: CAA §111, 42 USC §7411; 40 CFR Part 60.

Requirements: Establishes national standards of performance for new stationary sources. These standards are enforced at the local level with USEPA oversight. Relevant new stationary source performance standards are discussed under local LORS below.

Administering Agency: BAAQMD, with USEPA Region IX oversight.

National Emission Standards for Hazardous Air Pollutants
Authority: CAA §112, 42 USC §7412.

Requirements: Establishes national emission standards for hazardous air pollutants. These standards are enforced at the local level with USEPA oversight and are further discussed under local LORS and conformance.

Administering Agency: BAAQMD, with USEPA Region IX oversight.

8.1.4.1.2 State

Nuisance Regulation
Authority: CA Health & Safety Code §41700.

Requirements: Provides that "no person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property."

Administering Agency: BAAQMD and CARB.

Toxic "Hot Spots" Act
Authority: H& SC §44300-44384; 17 CCR §93300-93347.

Requirements: Requires preparation and biennial updating of inventory of facility emissions of hazardous substances listed by CARB, in accordance with CARB's regulatory guidelines. Risk assessments are to be prepared by facilities required to submit emissions inventories according to local priorities.

Administering Agency: BAAQMD and CARB.

CEC and CARB Memorandum of Understanding
Authority: CA Pub. Res. Code §25523(a); 20 CCR §1752, 1752.5, 2300-2309 and Div. 2, Chap. 5, Art. 1, Appendix B, Part (k).

Requirements: Provides for the inclusion of requirements in the CEC's decision on an application for certification to assure protection of environmental quality; application is required to include information concerning air quality protection.

Administering Agency: California Energy Commission.

8.1.4.1.3 Local

BAAQMD Regulations and Policies

Authority: CA Health & Safety Code §40001.

Requirements: Prohibit emissions and other discharges (such as smoke and odors) from specific sources of air pollution in excess of specified levels.

Administering Agency: BAAQMD, with CARB oversight.

Environment Code/Department of Public Health

Authority: Environment Code Chapter 10, Department of Public Works, Order No. 171,379.

Requirements: Require implementation of dust reduction measures set forth in the Environmental Code and Order 171,378 during construction of the project.

Administering Agency: City Agencies awarding contracts and the San Francisco Department of Public Works.

San Francisco Board of Supervisors Ordinances

Authority: Board of Supervisors Ordinance 124-01.

Requirements: Adopts minimum requirements for protection of human health and the environment for new electric generation at the Potrero Power Plant; requires approval of the Board of Supervisors for any agreement by City officials or departments for or related to new electric generation in Southeast San Francisco.

Administering Agency: San Francisco Board of Supervisors.

8.1.4.2 Conformance of Facility

As addressed in this section, SFERP is designed, and will be constructed and operated, in accordance with all relevant federal, state, and local requirements and policies concerning protection of air quality.

8.1.4.2.1 Federal and Bay Area Air Quality Management District Prevention of Significant Deterioration Program. USEPA has promulgated PSD regulations for areas that are in compliance with national ambient air quality standards (40 CFR 52.21). The PSD program allows new sources of air pollution to be constructed, or existing sources to be modified, while preserving the existing ambient air quality levels, protecting public health and welfare, and protecting Class I areas (e.g., specific national parks and wilderness areas). Although USEPA had delegated the authority to implement the PSD program to various California air pollution control districts, including the BAAQMD where SFERP is located (40 CFR 52.21[u]), that delegation was rescinded on March 3, 2003, and PSD permits for the Bay Area are now issued by USEPA Region IX. However, the BAAQMD regulations still require compliance with the BAAQMD's own PSD program.

The five principal areas of the federal PSD program are as follows:

- Applicability
- BACT
- Pre-construction monitoring

- Increments analysis
- Air quality impact analysis

The PSD requirements apply on a pollutant-specific basis to any project that is a new major stationary source or a major modification to an existing stationary source. (These terms are defined in federal regulations.) (40 CFR 52.21) The determination of applicability is based on evaluating the emissions changes associated with the proposed project in addition to all other emissions changes at the same location since the applicable PSD baseline dates (40 CFR 52.21).

Under the BAAQMD PSD program (Regulation 2, Rule 2), BACT must be applied when a new or modified major source shows emission increases in excess of 10 pounds per highest day of precursor organic compounds (POC), nonprecursor organic compounds (NPOC), NO_x, SO_2, PM_{10}, or CO. The BAAQMD program also dictates that a permit for a project will be denied if specified emissions thresholds are exceeded unless air dispersion modeling shows that ambient air quality standards will not be violated and the applicable PSD increments, as defined in the PSD rule, will not be exceeded. The PSD emission threshold levels for requiring modeling are shown in Table 8.1-11.

TABLE 8.1-11
BAAQMD Emission Threshold Levels for Modeling

Pollutant	Major Source Threshold
PM_{10}	100 tpy
NO_x	100 tpy
SO_2	100 tpy
VOC	100 tpy
CO	100 tpy

tpy = tons per year

The PSD program applies, on a pollutant-specific basis, only to a new major stationary source or to a major modification of an existing major stationary source that meets the following criteria:

- A new facility that will emit 100 tons per year (tpy) or more, and is one of the 28 PSD source categories in the federal CAA or any new facility that will emit 250 tpy or more; or

- A facility that emits 100 tpy or more with net emissions increases since the applicable PSD baseline date that exceed the significant emissions threshold levels.

Since the emissions from the SFERP will be less than 100 tpy, the PSD program requirements do not apply.

8.1.4.2.2 Federal New Source Performance Standards. The Standards of Performance for New Stationary Sources are source-specific federal regulations, limiting the allowable emissions of criteria pollutants (i.e., those that have a national ambient air quality standard). These regulations apply to certain sources depending on the equipment size, process rate, and/or the date of construction, modification, or reconstruction of the affected facility. Recordkeeping, reporting, and monitoring requirements are usually necessary for the regulated pollutants from each subject source; the reports must be regularly submitted to the reviewing agency (40 CFR 60.4). This program has been delegated by USEPA to the BAAQMD.

Subpart GG (Standards of Performance for Stationary Gas Turbines) applies to combustion turbines with a heat input at peak load equal to or greater than 10.7 gigajoules per hour (Gj/hr) (10.15 MMBtu/hr) at higher heating value. The SFERP combustion turbines have an hourly heat input that exceeds this threshold. The NSPS NO_x emission limit is defined by the following equation:

$$STD = \frac{0.0075 * 14.4}{Y} + F$$

Where:

STD = allowable NO_x emissions (percent volume at 15 percent O_2 on a dry basis)

Y = manufacturer's rated heat rate at peak load (kilojoules per watt hour)

F = NO_x emission allowance for fuel-bound nitrogen (assumed to be zero for natural gas)

The value of Y for the LM6000PC SPRINT CTGs is 8916 kJ/kWh LHV, or 9888 kJ/kWh HHV. This corresponds to a NSPS limit of 109 ppm.

USEPA recently issued a Notice of Proposed Rulemaking for a new Subpart KKKK that would apply to gas turbines with a heat input in excess of 1 MMBtu/hr that commence construction after February 18, 2005. Gas turbines subject to this rule would be exempt from Subpart GG. If the rule is ultimately adopted, it would be applicable to the proposed SFERP CTGs and Subpart GG would not apply.

Subpart KKKK limits NO_x and SO_2 emissions from the new gas turbines based on power output. The limits for turbines greater than 30 MW are 0.39 lb NO_x per MW-hr and 0.58 lb SO_2 per MW-hr. The proposed emissions limits of 2.5 ppmc NO_x and 0.402 ppmc SO_2 are equivalent to 0.09 lb NO_x /MW-hr and 0.009 lb SO_2 per MW-hr and are well below the proposed Subpart KKKK limits,

8.1.4.2.3 National Emissions Standards for Hazardous Air Pollutants. The National Emissions Standards for Hazardous Air Pollutants (NESHAPs) are either source-specific or pollutant specific regulations, limiting the allowable emissions of hazardous air pollutants from the affected sources (40 CFR 61). Unlike criteria air pollutants, hazardous air pollutants do not have a national ambient air quality standard but have been identified by USEPA as causing or contributing to the adverse health effects of air pollution.

Administration of the hazardous air pollutants program has been delegated to the BAAQMD and is described in Section 8.1.4.2.10 (40 CFR 61.04).

8.1.4.2.4 Federal Clean Air Act Amendments of 1990. In November 1990, substantial revisions and updates to the federal CAA were signed into law. This complex enactment addresses a number of areas that could be relevant to the proposed SFERP, such as SIP requirements for nonattainment areas that set new compliance deadlines and annual progress increments, more extensive permitting requirements, new USEPA mandates and deadlines for developing rules to control air toxic emissions, and acid deposition control. Following is a summary of the new provisions applicable to this project.

Title IV—Acid Deposition Control. This title requires the reduction of emissions of acidic compounds and their precursors (42 USC §7651 et seq.). The principal source of these compounds is the combustion of fossil fuels. Other requirements include monitoring and recordkeeping for emissions of SO_2 and NO_x and for opacity and volumetric flow.

Title V—Operating Permits. This title establishes a comprehensive operating permit program for major stationary sources (42 USC §7661 et seq.). Under the Title V program, a single permit is required that includes a listing of all the stationary sources, applicable regulations, requirements, and compliance determination.

The BAAQMD's Major Facility Review Program (Regulation 2, Rule 6) has been approved by USEPA and includes the acid rain program. Consequently, the BAAQMD has received delegation to implement the Title IV and V programs. The BAAQMD Title IV and V permit programs applicable to this project are summarized.

8.1.4.2.5 California Clean Air Act. AB 2595, the California CAA (Act), was enacted by the California Legislature and became law in January 1989. The Act requires the local air pollution control districts to attain and maintain both the federal and state ambient air quality standards at the "earliest practicable date." The Act contains several milestones for local districts and the CARB. In 1993, the BAAQMD submitted to the Air Resources Board an air quality plan defining the program for meeting the required emission reduction milestones in the Bay Area. Several updates to the original plan have also been submitted.

Air quality plans must demonstrate attainment of the state ambient air quality standards and must result in a five percent annual reduction in emissions of nonattainment pollutants (ozone, CO, NO_x, SO_2, and their precursors) in a given district (H&SC §40914). A local district may adopt additional stationary source control measures or transportation control measures, revise existing source-specific or new source review rules, or expand its vehicle inspection and maintenance program (H&SC §40918) as part of the plan. BAAQMD air quality plans specify the development and adoption of more stringent regulations to achieve the requirements of the Act. The applicable regulations that will apply to SFERP are included in the discussion of BAAQMD prohibitory rules in Section 8.1.4.2.8.

8.1.4.2.6 BAAQMD New Source Review Requirements. BAAQMD Regulation 2, Rule 2, New Source Review, requires that a pre-construction review be conducted for all proposed new or modified sources of air pollution. New Source Review contains three principal elements:

- BACT
- Emissions offsets
- Air quality impact analysis

BACT is required for any source that has an increase in emissions of any criteria pollutant and that has a potential to emit in excess of 10 pounds per highest day. The district rule also contains separate BACT thresholds for nine "non-criteria" pollutants, such as lead and various sulfur compounds.

The BAAQMD regulation further requires that for new or modified sources emitting in excess of 35 tons per year of POCs or NO_x, the total project emissions must be offset (i.e., an emission reduction comparable to the emission increase attributable to the source must be achieved at the project site or at another location). To ensure that there is no net increase in regional emissions as a result of new or modified sources, offsets at a ratio of 1.15 to 1.0 must be provided. For facilities emitting more than 10 but less than 35 tons per year of POCs or NO_x, offsets are provided by the BAAQMD from the Small Facility Banking account at a ratio of 1.0 to 1.0 unless ERCs are owned by the developer.

In addition, a Major Facility (100 tpy facility) is required to offset net emissions increases from a project, on a pollutant-specific basis, in excess of 1 tpy of PM_{10} and SO_2 that have occurred or will occur after April 5, 1991.

For the BAAQMD, an air quality impact analysis is required to demonstrate that the project must not cause a violation or interfere with the maintenance of any ambient air quality standards or applicable increments.

Finally, the district may impose appropriate monitoring requirements to ensure compliance. BAAQMD Regulation 2, Rule 3 specifies procedures for review and standards for approval of Authorities to Construct power plants within the BAAQMD. The applicant must obtain a Determination of Compliance and an Authority to Construct from the BAAQMD prior to commencing construction. An application for a Determination of Compliance and an Authority to Construct is expected to be filed with the BAAQMD within one week of the filing of the AFC with the CEC.

8.1.4.2.7 Risk Management Policy. The BAAQMD has developed a procedure for reviewing permit applications for projects that will emit compounds that may result in health impacts. The procedure requires comparing the potential emissions of toxic air contaminants from the project to specific levels, and requires the preparation of a written risk screening analysis if the levels are exceeded. The screening analysis includes estimates of the maximum annual concentrations of the toxic air contaminants, calculations of cancer risk, and comparison of maximum modeled concentrations with appropriate non-cancer threshold levels. The use of best available control technology for toxic air contaminant emissions is required if the incremental cancer risk from the project is projected to be between 1 and 10 in 1 million.

8.1.4.2.8 Other BAAQMD Regulatory Requirements. As required by the federal CAA and the California CAA, plans that demonstrate attainment must be developed for those areas that have not attained the national and state air quality standards (42 USC §7401; H&SC §40912). As part of its plan, the BAAQMD has developed regulations limiting emissions from specific sources. These regulations are collectively known as "prohibitory rules," because they prohibit the construction or operation of a source of pollution that would violate specific emission limits.

The general prohibitory rules of the BAAQMD applicable to the SFERP are as follows.

Regulation 1-301—Public Nuisance. Prohibits emissions in quantities that adversely affect public health, other businesses, or property.

Regulation 6—Particulate Matter and Visible Emissions. Limits the visible emissions from the project to no darker than No. 1 when compared to a Ringelmann Chart for a period or periods aggregating more than 3 minutes in any hour. Opacity is limited to no greater than 20 percent from any source for a period or periods aggregating 3 minutes in any hour. Particulate emission concentrations cannot exceed 0.15 grains per dry standard cubic foot of exhaust gas volume.

Regulation 7—Odorous Substances. Limits emission concentrations of dimethylsulfide, ammonia, mercaptan, phenols, and trimethylamine. This regulation becomes applicable upon confirmation of 10 or more odor complaints from the public within a 90-day period. Once the rule becomes applicable, it remains in effect for one year and can be re-triggered with the receipt of five or more odor complaints within a 90-day period.

Regulation 9, Rule 1—Sulfur Dioxide. Limits stationary source emissions of sulfur dioxide to less than 300 ppm. In addition, the rule restricts sulfur dioxide emissions that will result in ground-level concentrations in excess of 0.5 ppm continuously for 3 consecutive minutes, 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours.

Regulation 9, Rule 2—Hydrogen Sulfide. Limits the emission of hydrogen sulfide during any 24-hour period in such quantities that result in ground-level hydrogen sulfide concentrations in excess of 0.06 ppm averaged over 3 consecutive minutes or 0.03 ppm averaged over any 60 consecutive minutes.

Regulation 9, Rule 3—Nitrogen Oxides from Heat Transfer Operations. Limits emissions of nitrogen oxides from new or modified heat transfer operations to less than 125 ppm.

Regulation 9, Rule 9—Nitrogen Oxides from Stationary Gas Turbines. Limits emissions of nitrogen oxides from combustion turbines during baseload operations to less than 9 ppmv corrected to 15 percent oxygen.

Regulation 11, Rule 10—Hexavalent Chromium Emissions from Cooling Towers. Limits hexavalent chromium emissions from cooling towers by eliminating the use of chromium-based chemicals.

8.1.4.2.9 BAAQMD New Source Performance Standards. Regulation 10 (40 CFR 60 Subpart GG)—Standards of Performance for Stationary Gas Turbines. The BAAQMD has adopted by reference the federal New Source Performance Standard (NSPS) for stationary gas turbines. This regulation requires monitoring of sulfur and nitrogen in the fuel; limits emissions of NO_x and SO_2 emissions; requires source testing of emissions; requires emissions monitoring; and requires recordkeeping for the collected data.

8.1.4.2.10 BAAQMD Hazardous Air Pollutants. USEPA recently established a National Emissions Standards for Hazardous Air Pollutants (NESHAP) standard for formaldehyde from stationary gas turbines. This regulation applies to new and reconstructed gas turbines. Because the HAP emissions for the project are below the major source thresholds of 10 tpy for a single HAP and 25 tpy for any combination of HAPs, the project is exempt from the NESHAP for combustion turbines. Consequently, this regulation does not apply to the project and will not be addressed further. Please note that while Section 8.1.5.2.4 shows ammonia emissions greater than 25 tpy for the project, ammonia is not an HAP as defined by Section 112 of the CAA.

8.1.4.2.11 BAAQMD Title IV and Title V Programs

BAAQMD Regulation 2, Rule 6—Major Facility Review. This rule implements the operating permit requirements of Title V of the federal CAA. The rule applies to major facilities, Phase II acid rain facilities, subject solid waste incinerator facilities, and any facility listed by USEPA as requiring a Title V permit. As a Phase II acid rain facility, the SFERP will be required to submit a permit application to undergo a major facility review within 12 months of commencement of facility operation.

The BAAQMD has adopted by reference the federal Title IV (Acid Rain) Regulation and is now responsible for implementing the program through the Title V operating permit program. Under Title IV, a project must comply with maximum operating emissions levels for SO_2 and NO_x and is required to install and operate continuous monitoring systems for SO_2, NO_x, and CO_2 emissions. Extensive recordkeeping and reporting requirements are also part of the acid rain program.

8.1.4.2.12 San Francisco Board of Supervisors Ordinance No. 124-01 and Resolutions No. 827-02 and 458-03. In May 2001 the San Francisco Board of Supervisors adopted Ordinance No. 124-01, which sets forth minimum requirements for the protection of human health and the environment for any proposed new electric generation at the Potrero Power Plant and requires approval by the Board of Supervisors for any agreement by City officials or departments for or related to new electrical generation in San Francisco. The Ordinance calls for the Board to work with the SFPUC and the Department of the Environment (ENV) to adopt a new electricity resource plan for San Francisco. The Board has also adopted Resolution No. 827-02, which adopted the Electricity Resource Plan prepared by the SFPUC and ENV as policy guidelines, and Resolution No. 458-03, which opposes the Potrero Unit 7 power plant project.

All applicable LORS are summarized in Table 8.1-12.

8.1.5 Environmental Impacts

8.1.5.1 Overview of the Analytical Approach to Estimating Facility Impacts

The new emissions sources at the SFERP include three simple-cycle LM6000PC Sprint combustion turbines and a small two-cell cooling tower. The cooling tower will be used to provide plant auxiliary cooling water and to chill turbine inlet air, which increases power output under certain ambient conditions. Each turbine will be equipped with water injection and a selective catalytic reduction (SCR) system for NO_x control, and an oxidation catalyst for control of CO. Emissions control systems will be fully operational during all operations except startups and shutdowns. Maximum annual emissions are based on operation of the SFERP equipment at maximum firing rates for up to 12,000 engine hours per year, total for the three CTGs. (Annual facility operation will be limited to the equivalent of 12,000 full-load hours per year through an annual heat input limit.)

Ambient air quality impact analyses for the facility have been conducted to satisfy the CEC requirements for impacts from criteria pollutants (NO_2, CO, $PM_{10,}$ and SO_2) and noncriteria pollutants during project construction and operation. The following sections describe the emission sources that have been evaluated, the results of the ambient impact analyses, and the

TABLE 8.1-12
Laws, Ordinances, Regulations, Standards (LORS), and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Permit or Approval	Schedule and Status of Permit	Conformance (Section)
Federal					
CAA §160-169A and implementing regulations, Title 42 United States Code (USC) §7470-7491 (42 USC 7470-7491), Title 40 Code of Federal Regulations (CFR) Parts 51 & 52 (40 CFR 51 & 52) (Prevention of Significant Deterioration Program)	Requires prevention of significant deterioration (PSD) review and facility permitting for construction of new or modified major stationary sources of air pollution. PSD review applies to pollutants for which ambient concentrations are lower than NAAQS.	BAAQMD with USEPA oversight	After project review, issues Authority to Construct (ATC) with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.1 (p. 47), 8.1.4.2.1 (p.13), Appendix 8.1E
CAA §171-193, 42 USC §7501 et seq. (New Source Review)	Requires new source review (NSR) facility permitting for construction or modification of specified stationary sources. NSR applies to pollutants for which ambient concentration levels are higher than NAAQS.	BAAQMD with USEPA oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.1 (p. 47), 8.1.4.2.1 (p.13), Appendices 8.1-5, 8.1-6
CAA §401 (Title IV), 42 USC §7651 (Acid Rain Program)	Requires reductions in NO_x and SO_2 emissions.	BAAQMD with USEPA oversight	Issues Acid Rain permit after review of application.	Application to be made within 12 months of start of facility operation.	8.1.4.2.4 (p.15)
CAA §501 (Title V), 42 USC §7661 (Federal Operating Permits Program)	Establishes comprehensive permit program for major stationary sources.	BAAQMD with USEPA oversight	Issues Title V permit after review of application.	Application to be made within 12 months of start of facility operation.	8.1.4.2.4 (p.15)
CAA §111, 42 USC §7411, 40 CFR Part 60 (New Source Performance Standards [NSPS])	Establishes national standards of performance for new stationary sources.	BAAQMD with USEPA oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6 (p. 47), 8.1.4.2.2 (p. 14)
CAA §112, 42 USC §7412, 40 CFR Part 63 (National Emission Standards for Hazardous Air Pollutants [NESHAPs])	Establishes national emission standards for hazardous air pollutants.	BAAQMD with USEPA oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6 (p. 47), 8.1.4.2.3 (p. 15)
State					
California Health & Safety Code (H&SC) §41700 (Nuisance Regulation)	Outlaws discharge of such quantities of air contaminants that cause injury, detriment, nuisance, or annoyance.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.4.1.2 (p. 12)

TABLE 8.1-12
Laws, Ordinances, Regulations, Standards (LORS), and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Permit or Approval	Schedule and Status of Permit	Conformance (Section)
H&SC §44300-44384; California Code of Regulations (CCR) §93300-93347 (Toxic "Hot Spots" Act)	Requires preparation and biennial updating of facility emission inventory of hazardous substances; risk assessments.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Screening HRA submitted before start of construction.	8.1.5.4 (p.43), 8.1.4.1.2 (p.12), Appendix 8.1C
California Public Resources Code §25523(a); 20 CCR §1752, 2300-2309 (CEC & CARB Memorandum of Understanding)	Requires that CEC's decision on AFC include requirements to assure protection of environmental quality; AFC required to address air quality protection.	CEC	After project review, issues Final Determination of Compliance (FDOC) with conditions limiting emissions.	CEC approval of AFC, i.e., FDOC, to be obtained before start of construction.	8.1.4.1.2 (p. 13)
Local					
BAAQMD Regulation 1 §301 (Public Nuisance)	Prohibits emissions in quantities that adversely affect public health, other businesses, or property.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.3 (p.52), 8.1.4.2.8 (p.17)
BAAQMD Regulation 2 (Permits), Rule 2 (New Source Review)	NSR and PSD: Requires that preconstruction review be conducted for all proposed new or modified sources of air pollution, including BACT, emissions offsets, and air quality impact analysis.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.5.1, 8.1.5.2, 8.1.5.3, 8.1.5.4 (pp. 23-43), 8.1.6.3 (p.47), 8.1.4.2.6 (p. 16), Appendices 8.1-2, 8.1-5, 8.1-6
BAAQMD Regulation 2, Rule 6 (Major Facility Review)	Implements operating permits requirements of CAA Title V and acid rain regulations of CAA Title IV.	BAAQMD	Issues Title V permit after review of application.	Application to be made within 12 months of start of facility operation.	8.1.6.1 (p. 52), 8.1.4.2.4 (p. 15), 8.1.4.2.11 (p. 19)
BAAQMD Regulation 6 (Particulate Matter and Visible Emissions)	Limits visible emissions to no darker than Ringelmann No. 1 for periods greater than 3 minutes in any hour; limits PM emissions to 0.15 gr/dscf.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.3 (p. 52), 8.1.4.2.8 (p. 17)
BAAQMD Regulation 7 (Odorous Substances)	Limits emissions of dimethylsulfide, ammonia, mercaptan, phenols, and trimethylamine; becomes applicable upon confirmation of 10 or more odor complaints with 90 days.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.3 (p. 53), 8.1.4.2.8 (p. 17)
BAAQMD Regulation 9, Rule 1 (Sulfur Dioxide)	Limits SO_2 emissions to <300 ppm; also limits SO_2 emissions resulting in ground level concentrations of specified level and duration.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.3 (p. 53), 8.1.4.2.8 (p. 18)

TABLE 8.1-12
Laws, Ordinances, Regulations, Standards (LORS), and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Permit or Approval	Schedule and Status of Permit	Conformance (Section)
BAAQMD Regulation 9, Rule 2 (Hydrogen Sulfide)	Limits H_2S emissions during any 24-hour period that result in ground level H_2S concentrations exceeding specified levels and durations.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.3 (p. 53), 8.1.4.2.8 (p. 18)
BAAQMD Regulation 9, Rule 3 (Heat Transfer Operation NO_x Emissions Limits)	Limits NO_x emissions from new heat transfer operations 250 MMBtu/hr maximum to <125 ppm.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.3 (p. 53), 8.1.4.2.8 (p. 18)
BAAQMD Regulation 9, Rule 9 (Nitrogen Oxides from Stationary Gas Turbines)	Limits NO_x emissions during baseload operations to 9 ppmv @ 15 percent exhaust oxygen (15 ppmv if SCR is not used).	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.3 (p. 53), 8.1.4.2.8 (p. 18)
BAAQMD Regulation 10 (40 CFR 60 Subpart GG) (Standards of Performance for Stationary Gas Turbines)	Requires monitoring of fuel, other operating parameters; limits NO_x and SO_2 emissions, requires source testing, emissions monitoring, and recordkeeping.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.3 (p. 53), 8.1.4.2.8 (p. 19)
BAAQMD Regulation 11, (Hazardous Pollutants)	Implements federal NESHAP regulations.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.4.1.1 (p. 12), 8.1.4.2.3 (p. 19)
San Francisco Board of Supervisors Ordinance No. 124-01	Requires Board of Supervisors approval for any agreement by City officials or departments for or related to new electric generation in Southeast San Francisco.	SF Board of Supervisors	After project review, votes to approve or disapprove financing and key contracts for the project.	Board of Supervisors approval of financing and key contracts for the project to be obtained before start of construction.	8.1.6.4 (p. 56)

evaluation of facility compliance with the applicable air quality regulations, including BAAQMD Regulation 2 (Permits). Regulation 2, Rule 2 includes the BAAQMD's NSR requirements.

8.1.5.1.1 New Equipment. The proposed combustion turbines are General Electric LM6000PC Sprint combustion turbines driving nominal 48 MW turbine generators. The combustion turbines will be fueled exclusively with natural gas. The combustion turbines will be equipped with water injection to control NOx emissions and inlet air chillers to maintain turbine output across the full range of ambient temperatures. Post-combustion air pollution controls will include SCR for NOx control and oxidation catalysts for carbon monoxide (CO) control. Any or all of the combustion turbines may be operated up to 24 hours per day, 7 days per week, with total plantwide heat input not to exceed the equivalent of 12,000 full-load engine hours per year. (Annual facility operation will be limited to the equivalent of 12,000 full-load hours per year through an annual heat input limit.) Specifications for the new combustion turbines are summarized in Table 8.1-13. A typical fuel analysis is summarized in Table 8.1-14.

TABLE 8.1-13
New LM6000PC Combustion Turbine Design Specifications

Manufacturer	General Electric
Model	LM6000PC
Fuel	Natural gas
Design Ambient Temperature*	36°F
Nominal Heat Input Rate:	487.3 MMBtu/hr @ HHV
Nominal Power Generation Rate:	48 MW
Nominal Exhaust Temperature:	826°F
Exhaust Flow Rate:	620,308 acfm
Exhaust O_2 Concentration, dry volume:	14.5%
Exhaust CO_2 Concentration, dry volume:	3.7%
Exhaust Moisture Content, wet volume:	11.2%
Emission Controls:	Water Injection and SCR (2.5 ppmv NO_x @ 15% O_2)
	Oxidation Catalyst (4 ppmv CO @ 15% O_2)

Note:
* Low-temperature scenario.

Engineering specifications for the turbines are contained in Appendix 8.1A, Table 8.1A-1.

The small two-cell cooling tower will be constructed adjacent to the turbines. The cooling tower will serve the condenser circuit heat rejection of the mechanical chillers used to chill the air entering the turbines. Specifications for the cooling tower are shown in Table 8.1-15.

TABLE 8.1-14
Nominal Fuel Properties—Natural Gas

Component Analysis		Chemical Analysis	
Component	**Average Concentration, Percent by Volume**	**Constituent**	**Percent by Weight**
CH_4	95.80	C	72.85
C_2H_6	1.94	H	23.91
C_3H_8	0.30	N	1.75
C_4H_{10}	0.09	O	1.50
C_5H_{12}	0.02	S	<1 gr/100 scf
N_2	1.05	Higher Heating Value	1,017 Btu/scf 22,895 Btu/lb
CO_2	0.79		
S	<0.00		

TABLE 8.1-15
Cooling Tower Specifications

Parameter	Value
Water Flow Rate, 10E6 lbm/hr	1.96
Water Flow Rate, gal/min	3,912
Drift Rate, Percent	0.001
Exhaust Flow Rate, ft^3/min (per cell, 2 cells)	214,950

8.1.5.1.2 Facility Operations

New LM6000PC Simple Cycle Combustion Turbines. General Electric provided combustion turbine performance specifications for three temperature scenarios—high temperature (80°F), ISO temperature (59°F), and low temperature (36°F). The ISO-temperature scenario with inlet air chilling was used to characterize maximum emissions because it has the highest hourly heat input and emission rates. Maximum daily operations are based on full-load operation of three combustion turbine generators (CTGs) for 24 hours. Maximum annual emissions are based on full-load operation for the equivalent of 12,000 full-load engine hours per year. Heat input limits, as summarized in Table 8.1-16, were established to provide the basis for the calculation of project and facility emissions.

TABLE 8.1-16
LM6000PC Combustion Turbine Operations

Interval	Heat Input, MMBtu (HHV)	
	Each CTG	Total, Three CTGs
Hourly	487.3	1,462
Daily	11,700	35,100
Annual	4,268,750	5,847,600

New Cooling Tower. The cooling tower will operate when inlet air chilling is necessary to maintain turbine output. For this application, the cooling tower is assumed to operate 24 hours per day, 8,760 hours per year.

8.1.5.2 Emissions Assessment: Criteria Pollutants

Criteria pollutants emitted from the combustion turbines include NO_x, sulfur oxides (SO_X), CO, POCs and fine particulate matter (PM_{10}). (All of the particulate matter emitted from the CTGs and the cooling tower is assumed to be less than 2.5 microns in diameter. All references to PM_{10} include $PM_{2.5}$ as well.) The cooling tower will emit only small quantities of PM_{10}. This section of the application presents calculated emissions from the new equipment.

The combustion turbines and cooling tower also will emit trace levels of toxic air contaminants (TACs), including ammonia. This section also presents the maximum TAC emissions from the proposed combustion turbines. Tables containing the detailed TAC emission calculations are included in Appendix 8.1A.

8.1.5.2.1 Criteria Pollutant Emissions: Combustion Turbines. Proposed maximum emissions from the LM6000PC combustion turbines were estimated on an hourly, daily, and annual basis based on expected peaking operation and proposed annual operating limitations.

Emissions During Normal Operations. Emissions of NO_x, CO, and POC were calculated from emission limits (in ppmv @ 15-percent O_2) and the exhaust flow rates. The NO_x emission limit reflects the application of SCR. The POC emission limit reflects the use of good combustion practices. The CO emission limit reflects the expected performance of the oxidation catalyst. Maximum emissions were based on the exhaust rate (222,850 dscfm) associated with the heat input rates shown in Table 8.1-16.

SO_X emissions were calculated from the heat input (in MMBtu) and a SO_X emission factor (in lb/MMBtu). The SO_X emission factor of 0.00092 lb/MMBtu was derived from the expected annual average fuel sulfur content of 0.33 grains per 100 standard cubic feet. Maximum SO_X emissions were calculated using the heat input rates in Table 8.1-16.

Maximum hourly PM_{10} emissions were obtained from manufacturer's guarantees for LM6000PC combustion turbines in previous applications and are based on results of recent source tests of similar turbines. $PM_{2.5}$ emissions were determined based on the assumption that all particulate matter emissions are less than 2.5 microns in size.

Maximum emission rates for the LM6000PC combustion turbines are summarized in Table 8.1-17. The BACT analysis upon which the emission factors are based is presented in Appendix 8.1E and summarized in Section 8.1.6.3.

TABLE 8.1-17
Maximum Emission Rates—Each CTG

Pollutant	ppmv @ 15% O_2	lb/MMBtu	lb/hr
NO_x	2.5[a]	0.009	4.41
SO_2[b]	0.15	0.00092	0.45
CO	4.0[a]	0.0088	4.30
POC	2.0[a]	0.0025	1.23
PM_{10}	n/a	n/a	3.0

Notes:

[a] NO_X, CO and POC emission rates exclude startups and shutdowns (see Table 8.1-18).

[b] Based on annual average natural gas sulfur content of 0.33 gr/100 scf.

Emissions During Startup and Shutdown. Maximum emission rates expected to occur during a startup or shutdown are shown in Table 8.1-18. PM_{10} and SO_2 emissions are not included in this table because emissions of these pollutants will be lower during startup and shutdown than during baseload facility operation.

TABLE 8.1-18
CTG Startup and Shutdown Emission Rates

	NO_x	CO	POC
Startup and Shutdown, lb/hr	40	10	2

8.1.5.2.2 Criteria Pollutants: Cooling Tower. Maximum emissions from the cooling tower are calculated from the average water flow rate, maximum drift rate, and maximum TDS of the make-up water. This calculation is shown in Appendix 8.1A, Table 8.1A-2a. Because the on-site water treatment facility has not yet been constructed, no recycled water is yet available for analysis. However, the applicant has performed an engineering analysis that indicates that the recycled water will have a maximum TDS content of 400 μg/L. The maximum TDS in the cooling tower circulating water was determined by assuming 5 cycles of concentration. The engineering analysis shown in Appendix 8.1A, Table 8.1A-2b shows the expected TDS content for the recycled water. SFERP will keep the TDS of the cooling tower circulating water at or below 2000 μg/L by either controlling the TDS of the recycled water or by reducing the cycles of concentration as necessary.

Although the cooling tower will operate only under high-temperature ambient conditions, emissions are calculated on a 24-hour per day, 8,760-hour per year basis. The two-cell cooling tower will emit a maximum of 0.04 pounds per day and 0.2 tons per year of PM_{10}.

As emissions from the tower are less than 10 pounds per day and 5 tons per year, the cooling tower is exempt from permitting and is not subject to BACT or offset requirements.

A description of the onsite water treatment process is provided in Section 2.2.7.3 of the AFC. The only potential air contaminants from the water treatment process would be odorous compounds. As described in Section 2.2.7.3 of the AFC, equipment open to the atmosphere will be vented through an activated carbon collection system to control odors.

8.1.5.2.3 Criteria Pollutant Emissions Summary. Maximum facility emissions are shown in Table 8.1-19. The emission calculations are based on the CTG emission rates shown in Tables 8.1-17 and 8.1-18, the fuel use limitations in Table 8.1-16, and the following assumptions:

- Each CTG may operate up to 24 hours per day.
- Each CTG may have up to two 2-hour startups per day, with a total of 4 hours of startup/shutdown activity for each CTG.
- Under typical operating conditions, only one CTG would start up at a time; however, under certain conditions, all 3 CTGs could start up simultaneously.
- Each CTG may have a total of 250 hours per year of startup/shutdown activity.
- Total annual fuel use by all 3 CTGs will be limited to the equivalent of 12,000 hours per year for the facility.

TABLE 8.1-19
Maximum Emissions from New Equipment

Emissions/Equipment	NO_x	SO_2	CO	POC	PM_{10}
Maximum Hourly Emissions					
CTGs	120.0	1.3	30.0	6.0	9.0
Cooling Towers	–	–	–	–	<0.1
Total, pounds per hour	**120.0**	**1.3**	**30.0**	**6.0**	**9.0**
Maximum Daily Emissions					
CTGs	744.6	32.3	378.0	97.8	216.0
Cooling Towers	–	–	–	–	0.9
Total, pounds per day	**744.6**	**32.3**	**378.0**	**97.8**	**216.9**
Maximum Annual Emissions, tpy					
CTGs	39.8	2.7	27.9	7.7	18.0
Cooling Towers	–	–	–	–	0.2
Total, tons per year	**39.8**	**2.7**	**27.9**	**7.7**	**18.2**

8.1.5.3 Emissions Assessment: Toxic Air Contaminants

8.1.5.3.1 Toxic Air Contaminant Emissions: Combustion Turbines. Maximum hourly and annual TAC emissions were estimated for the proposed LM6000PC combustion turbines. Maximum proposed TAC emissions were calculated from the heat input rate (in MMBtu/hr and MMBtu/yr), emission factors (in lb/mmcf), and the nominal higher heating value of 1,017 Btu/scf. Hourly and annual emissions were based on the heat input rates shown in Table 8.1-16. The ammonia emission factor was derived from an ammonia slip limit of 10 ppmv @ 15-percent O_2. Other emission factors were obtained from AP-42 (Table 3.1-3, 4/00, and Table 3.4-1 of the Background Document for Section 3.1) and from the California Air Resources Board's CATEF database for combustion turbines. TAC emissions are summarized in Table 8.1-20.

TABLE 8.1-20
Maximum Proposed TAC Emissions: Combustion Turbines

Compound	Emission Factor (lb/mmcf)[a]	Maximum Proposed Emissions, 3 CTGs	
		(lb/hr)	(lb/year)
Ammonia[b]	10 ppm	19.6	78,480
Propylene	0.771	1.1	4,433
Hazardous Air Pollutants			
Acetaldehyde	0.0408	0.06	235
Acrolein	0.00369	$5.3x10^{-3}$	21
Benzene	0.00333	$4.8x10^{-3}$	19
1,3-Butadiene	0.000439	$6.3x10^{-4}$	2.5
Ethylbenzene	0.0326	0.05	187
Formaldehyde	0.367	0.53	2,110
Hexane	0.259	0.37	1,489
Naphthalene	0.00166	$2.4x10^{-3}$	9.5
PAHs[c]	0.00017	$2.6x10^{-4}$	1.0
Propylene Oxide	0.0296	0.04	170
Toluene	0.133	0.19	765
Xylene	0.0653	0.09	376
TOTAL HAPs		**1.4**	**5,385**

Notes:
[a] Obtained from AP-42 and the CATEF database for natural gas-fired combustion turbines. See text.
[b] Based on an exhaust NH_3 limit of 10 ppmv @ 15% O_2.
[c] Carcinogenic PAHs only; naphthalene considered separately.

8.1.5.3.2 Toxic Air Contaminant Emissions: Cooling Tower. TAC emissions from the cooling tower were calculated from the maximum drift (see Appendix 8.1A, Table 8.1A-2) of approximately 20 pounds of water per hour and an analysis of cooling tower blowdown.

These calculations are shown in Appendix 8.1A, Table 8.1A-5. This table includes a comparison of the maximum cooling tower TAC emission rates with the BAAQMD TAC trigger levels, and shows that TACs from the cooling tower will be well below the trigger levels. Therefore, the TAC emissions from the cooling tower are considered to be negligible and are not evaluated further.

8.1.5.4 Air Quality Impact Analysis

BAAQMD Rule 2-2-414 requires the applicant to provide ambient air quality modeling analyses and other impact assessments. This rule is applicable only if the proposed project is subject to PSD review, if it is a major facility with emissions of certain noncriteria pollutants in excess of the amounts listed in Rule 2-2-306, or if it is a facility with a net emissions increase greater than zero that proposes construction within 10 miles of a Class I area. Table 8.1-19 shows that emissions of all pollutants from the new facility will be less than 100 tons per year, so the facility is not a major source or subject to PSD. (Simple cycle combustion turbines are not one of the 28 PSD source categories listed in Section 169(1) of the CAA, so the facility would not be subject to PSD unless its emissions equal or exceed 250 tpy.) Further, the proposed facility will not be located within 10 miles of a Class I area. (The nearest Class I area, Point Reyes Wilderness Area, is over 20 miles from the project site.) Therefore, the modeling requirements of Regulation 2, Rule 2 are not applicable to the proposed project. However, the CEC requires various ambient air quality impact analyses for CEQA review, and those analyses are presented in this section.

8.1.5.4.1 Air Quality Modeling Methodology. An assessment of impacts from the SFERP combustion turbines on ambient air quality has been conducted using USEPA-approved air quality dispersion models. These models are based on various mathematical descriptions of atmospheric diffusion and dispersion processes in which a pollutant source impact can be calculated over a given area.

Figure 8.1B-1 in Appendix 8.1B shows the building layout used in the modeling analysis. Although the anticipated new construction on the adjacent MUNI Operations and Maintenance Facility has not yet begun, the buildings to be installed on the site are reasonably foreseeable and therefore are included in the layout to ensure that any downwash impacts are considered. The impact analysis was used to determine the worst-case ground-level impacts of the new turbines. The results were compared with established state and federal ambient air quality standards and PSD significance levels. If the standards are not exceeded then it is assumed that, in the operation of the facility, no exceedances are expected under any conditions. In accordance with the air quality impact analysis guidelines developed by USEPA (40 CFR Part 51, Appendix W: Guideline on Air Quality Models) and CARB (Reference Document for California Statewide Modeling Guideline, April 1989), the ground-level impact analysis includes the following assessments:

- Impacts in simple, intermediate, and complex terrain
- Aerodynamic effects (downwash) due to nearby building(s) and structures
- Impacts from inversion breakup (fumigation)
- Impacts from shoreline fumigation conditions

Simple, intermediate, and complex terrain impacts were assessed for all meteorological conditions that would limit the amount of final plume rise. Plume impaction on elevated terrain, such as on the slope of a nearby hill, can cause high ground-level concentrations, especially under stable atmospheric conditions. Another dispersion condition that can cause high ground-level pollutant concentrations is caused by building downwash. Building downwash can occur when wind speeds are high and a building or structure is in close proximity to the emission stack. This can result in building wake effects where the plume is drawn down toward the ground by the lower pressure region that exists in the lee side (downwind) of the building or structure.

Fumigation conditions occur when the plume is emitted into a low-lying layer of stable air (inversion) that then becomes unstable, resulting in a rapid mixing of pollutants toward the ground. The low mixing height that results from this condition allows little diffusion of the stack plume before it is carried downwind to the ground. Although fumigation conditions rarely last as long as an hour, relatively high ground-level concentrations may be reached during that period. Fumigation tends to occur under clear skies and light winds, and is more prevalent in the summer. Because land surfaces tend to both heat and cool more rapidly than water, shoreline fumigation tends to occur on sunny days when the denser cooler air over water displaces the warmer, lighter air over land. During an inland sea breeze, the unstable air over land gradually increases in depth with inland distance. The boundary between the stable air over the water and the unstable air over the land and the wind speed determine if the plume will loop down before much dispersion of the pollutants has occurred.

The basic model equation used in this analysis assumes that the concentrations of emissions within a plume can be characterized by a Gaussian distribution about the centerline of the plume. Concentrations at any location downwind of a point source such as a stack can be determined from the following equation:

$$C(x,y,z,H) = \left(\frac{Q}{2\pi\sigma_y\sigma_z u}\right) * \left(e^{-1/2\left(y/\sigma_y\right)^2}\right) * \left[\left\{e^{-1/2\left(z-H/\sigma_z\right)^2}\right\} + \left\{e^{-1/2\left(z+H/\sigma_z\right)^2}\right\}\right]$$

Where:

C = the concentration in the air of the substance or pollutant in question

Q = the pollutant emission rate

$\sigma y \sigma z$ = the horizontal and vertical dispersion coefficients, respectively, at downwind distance x

u = the wind speed at the height of the plume center

x,y,z = the variables that define the 3-dimensional Cartesian coordinate system used; the downwind, crosswind, and vertical distances from the base of the stack

H = the height of the plume above the stack base (the sum of the height of the stack and the vertical distance that the plume rises due to the momentum and/or buoyancy of the plume)

Gaussian dispersion models are approved by USEPA for regulatory use and are based on conservative assumptions (i.e., the models tend to overpredict actual impacts by assuming steady-state conditions, no pollutant loss through conservation of mass, no chemical reactions, etc.). The USEPA models were used to determine if ambient air quality standards would be exceeded, and whether a more accurate and sophisticated modeling procedure would be warranted to make the impact determination. The following sections describe:

- Screening modeling procedures
- Refined air quality impact analysis
- Existing ambient pollutant concentrations and preconstruction monitoring
- Results of the ambient air quality modeling analyses
- PSD increment consumption

The screening and refined air quality impact analyses were performed using the Industrial Source Complex, Short-Term Model ISCST3 (Version 02035). ISCST3 is a Gaussian dispersion model capable of assessing impacts from a variety of source types in areas of simple, intermediate, and complex terrain. The model can account for settling and dry deposition of particulates; area, line, and volume source types; downwash effects; and gradual plume rise as a function of downwind distance. The model is capable of estimating concentrations for a wide range of averaging times (from one hour to one year).

Inputs required by the ISCST3 model include the following:

- Model options
- Meteorological data
- Source data
- Receptor data

Model options refer to user selections that account for conditions specific to the area being modeled or to the emissions source that needs to be examined. Examples of model options include use of site-specific vertical profiles of wind speed and temperature; consideration of stack and building wake effects; and time-dependent exponential decay of pollutants. The model supplies recommended default options for the user. Except where explicitly stated, such as for building downwash, as described in more detail below, default values were used. A number of these default values are required for USEPA and BAAQMD approval of model results and are listed here.

- Urban dispersion coefficients (see following discussion)
- Gradual plume rise
- Stack tip downwash
- Buoyancy induced dispersion
- Calm processing
- Default urban wind profile exponents
- Default vertical temperature gradients = 0.02, 0.035
- 10 meter anemometer height

A land use analysis was prepared using the Auer (1978) land use classification system to determine whether the area around the SFERP power plant site is predominantly rural or urban. The analysis determined that the land use surrounding the site is greater than 50 percent urban (approximately 59 percent urban and 41 percent rural); therefore, for this modeling analysis, urban dispersion coefficients have been used.

ISCST3 uses hourly meteorological data to characterize plume dispersion. The representativeness of the data is dependent on the proximity of the meteorological monitoring site to the area under consideration, the complexity of the terrain, the exposure of the meteorological monitoring site, and the period of time during which the data are collected. The meteorological data used in this analysis were collected at the Potrero power plant monitoring station adjacent to the project site. This data set was selected to be representative of meteorological conditions at the SFERP site and to meet the requirements of the USEPA "On-Site Meteorological Program Guidance for Regulatory Model Applications" (USEPA, 1995). The analysis used meteorological data collected during 1992.

USEPA defines the term "on-site data" to mean data that would be representative of atmospheric dispersion conditions at the source and at locations where the source may have a significant impact on air quality. Specifically, the meteorological data requirement originates in the CAA at section 165(e)(1). Section 165(e)(1) defines on-site meteorology as the collection "of the ambient air quality at the proposed site and in areas which may be affected by emissions from such facility for each pollutant subject to regulation under [the Act] which will be emitted from such facility."

This definition and USEPA's guidance on the use of on-site monitoring data are also outlined in the "On-Site Meteorological Program Guidance for Regulatory Modeling Applications" (USEPA, 1987). The representativeness of the data is dependent upon (a) the proximity of the meteorological monitoring site to the area under consideration, (b) the complexity of the topography of the area, (c) the exposure of the meteorological sensors, and (d) the period of time during which the data are collected. As discussed below, we believe the meteorological data from the Potrero power plant monitoring station satisfy the definition of on-site data. The project site and the Potrero power plant monitoring station are located within approximately 0.5 mile of each other along the southwest side of San Francisco Bay.

The wind roses shown in Figure 8.1-5 for the Potrero monitoring station indicate moderate wind speeds (the average wind speed is approximately 2.8 m/s), with a predominant wind direction of west-southwest and a secondary maximum at west. Analysis of a stability rose of the Potrero monitoring station demonstrates that D stability occurs up to 49 percent of the time for the data set. The predominance of D stability is primarily due to the large frequency of breezy conditions. The Potrero monitoring site and the project site have similar exposure: both are located about 0.5 mile from the elevated terrain and adjacent to San Francisco Bay. The Potrero met data were collected less than 0.5 mile from the project site.

The other two meteorological data sets considered for use in evaluating the impacts of this project are those collected at the San Francisco Waste Water Treatment Plant (WWTP) and at Hunters Point power plant. Both of these data sets were collected at a greater distance from the project site (over a mile away). Both the WWTP and Hunters Point met stations have different exposures to elevated terrain: these sites are located approximately 1 to 1.5 miles east of Bernal Heights, in contrast to the Potrero site which is approximately 0.5 mile east of Potrero Hill. In addition, and the WWTP and Hunters Point sites are just north of the hilly terrain of the Bayview District, while the distances to terrain in the south from both the Potrero site and the project site are much greater. The different exposure to elevated terrain results in a different influence of that terrain on the winds monitored at the site, so that wind speeds and directions monitored at the WWTP and Hunters Point sites are believed to be less similar to those experienced at the project site than the meteorology at the Potrero site.

Representativeness has also been defined in the "Workshop on the Representativeness of Meteorological Observations" (Nappo et. al., 1982) as "the extent to which a set of measurements taken in a space-time domain reflects the actual conditions in the same or different space-time domain taken on a scale appropriate for a specific application." Judgments of representativeness should be made only when sites are climatologically similar, as the project site and the Potrero met station clearly are. Representativeness has also been defined in the PSD Monitoring Guideline as data that characterize the air quality for the general area in which the proposed project would construct and operate. The large-scale topographic features that influence the Potrero monitoring station also influence the proposed project site in the same manner.

In determining the representativeness of the Potrero monitoring station relative to the project site, the following considerations were addressed.

Aspect ratio of terrain, which is the ratio of height to width of hill at base - The aspect ratio of the hill near the Potrero monitoring station (Potrero Hill) is identical to that of the terrain near the project site: approximately 300 feet in height to approximately one mile of width at base. The aspect ratio of the largest hill near the WWTP and Hunters Point monitoring sites (Bernal Heights to the west) is different: 440 feet in height to approximately 2 miles of width at base.

Slope of terrain - Terrain in the immediate vicinity surrounding the project site and the Potrero monitoring station is identical: Potrero Hill rises to the west and the bay lies immediately east while the terrain is flat to the north and south. The terrain surrounding the WWTP and Hunters Point monitoring sites is not as similar as the elevated terrain to the west is farther away at both sites. In addition, it is quite hilly immediately south of the WWTP and Hunters Point sites, unlike the flat terrain immediately south of the Potrero met station and the project site.

Correlation of terrain features to prevailing meteorological conditions - As discussed in detail earlier, the orientation and aspect of terrain in the project area correlates well with the prevailing wind fields in the Potrero wind rose. The Potrero monitoring site and the project site have similar exposure to winds that are channeled between Potrero Hill and Bernal Heights, resulting in the prevailing west-southwest and westerly winds at both locations. The west-southwest component is partly blocked at the WWTP and Hunters Point sites by Bernal Heights to the west and by the hilly terrain of the Bayview District to the south.

Thus, it is our assessment that the wind direction and wind speed data collected at the Potrero monitoring station are more representative of dispersion conditions at the project site than are the data collected at the WWTP and Hunters Point.

The required emission source data inputs to ISCST3 include source locations, source elevations, stack heights, stack diameters, stack exit temperatures and velocities, and emission rates. The source locations are specified for a Cartesian (x,y) coordinate system where x and y are distances east and north in meters, respectively. The Cartesian coordinate system used is the Universal Transverse Mercator Projection (UTM). The stack height that can be used in the model is limited by federal and BAAQMD Good Engineering Practice

(GEP) stack height restrictions, discussed in more detail below. In addition, ISCST3 requires nearby building dimension data to calculate the impacts of building downwash.

For the purposes of modeling, a stack height beyond what is required by Good Engineering Practices is not allowed (BAAQMD Regulation 2-2-418). However, this requirement does not place a limit on the actual constructed height of a stack. GEP as used in modeling analyses is the height necessary to ensure that emissions from the stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, or wakes that may be created by the source itself, nearby structures, or nearby terrain obstacles. In addition, the GEP modeling restriction assures that any required regulatory control measure is not compromised by the effect of that portion of the stack that exceeds the GEP. The USEPA guidance ("Guideline for Determination of Good Engineering Practice Stack Height," Revised 6/85) for determining GEP stack height indicates that GEP is the lesser of 65 meters or H_g, where H_g is calculated as follows:

$$H_g = H + 1.5L$$

Where:

- H_g = Good Engineering Practice stack height, measured from the ground-level elevation at the base of the stack
- H = height of nearby structure(s) measured from the ground-level elevation at the base of the stack
- L = lesser dimension, height or maximum projected width, of nearby structure(s)

In using this equation, the guidance document indicates that both the height and width of the structure are determined from the frontal area of the structure, projected onto a plane perpendicular to the direction of the wind.

For the two westernmost turbine stacks, the nearby (influencing) structure is the offsite MUNI terminal building, west of the project site, whose upper tier is 41 feet (12.5 m) high, 549 feet (167.3 m) long and 139 feet (42.4 m) wide. Thus H = L = 41 feet, and H_g = 2.5 * 65 = 102.5 ft, so the proposed stack height of 85 feet does not exceed GEP stack height. For the easternmost turbine stack, the nearby (influencing) structure is the chiller structure, which is 40.0 feet (12.2 m) high, 48.6 feet (14.8 m) wide and 14.3 ft (4.4 m) long. Thus, H generally equals L = 40.0 feet, and H_g = 2.5 * 40.0 = 100.0 ft, so the proposed stack height of 85 feet does not exceed GEP stack height.

For regulatory applications, a building is considered sufficiently close to a stack to cause wake effects when the downwind distance between the stack and the nearest part of the building is less than or equal to five times the lesser of the height or the projected width of the building. Building dimensions for the buildings analyzed as downwash structures were obtained from plot plans. The building dimensions were analyzed using the Building Profile Input Program (BPIP) to calculate 36 wind-direction-specific building heights and projected building widths for use in building wake calculations. The building dimensions used in the GEP analysis are shown in Appendix 8.1B, Table 8.1B-1, and Figure 8.1B-1.

Screening Procedures and Unit Impact Modeling. To ensure the impacts analyzed were for maximum emission levels and worst-case dispersion conditions, a screening procedure was used to determine the inputs to the impact modeling. The screening procedure analyzed the turbine operating conditions that would result in the maximum impacts on a pollutant-specific basis. The operating conditions examined in this screening analysis, along with their exhaust and emission characteristics, are shown in Appendix 8.1B, Table 8.1B-2. These operating conditions represent turbine operation at maximum, typical, and minimum ambient operating temperatures (80°F, 59°F, and 36°F), and at full and minimum (50-percent) loads.

Ambient impacts for each of the six operating cases were modeled using USEPA's ISCST3 model and one year of on-site meteorological data, as described above. The results of the unit impact analysis are presented in Appendix 8.1B, Table 8.1B-3. The analysis showed that for some pollutants and averaging period, modeled impacts were highest under full load operating conditions, while for others, including PM_{10}, impacts were highest under minimum load conditions. The Case 6 stack parameters and emission rates were used in the refined modeling analysis to evaluate the combined impacts of the turbines and cooling towers. For the unit impacts analysis, the CEC staff's recommendation regarding receptor grid spacing has been followed (SFPUC, 2003). (25-meter resolution along the facility fenceline to 100 meters from the fenceline, 100 meter resolution from 100 meters to 1,000 meters from the fenceline, and 250-meter spacing out to as far as 10 km from the site.)

Refined Air Quality Impact Analysis. The stack parameters and emission rates used to model PM_{10} impacts from the SFERP combustion turbines and cooling towers are shown in Appendix 8.1B, Table 8.1B-4. As discussed above, the turbine stack parameters for Case 6 were used in modeling 24-hour and annual average impacts for PM_{10} in complex terrain using the CTSCREEN model and screening meteorological data. The model receptor grids were derived from 30-meter DEM data. The CEC guidance cited above was used to locate receptors. Twenty-five-meter refined receptor grids were used in areas where the coarse grid analyses indicated modeled maxima for each site plan would be located. A map showing the layout of each receptor grid around the site plan is presented in Figure 8.1B-2, Appendix 8.1B.

The unit impact/screening and refined analyses included simple, intermediate, and complex terrain. Terrain features were taken from USGS DEM data and 7.5-minute quadrangle maps of the area including San Francisco North, San Francisco South, Oakland West, Oakland East, Hunters Point, and San Leandro. The coarse grid contained 6,561 receptors at 250-meter resolution and a semi-coarse near-facility grid contained 527 receptors at 100-meter resolution. The refined grids contained 34,549 receptors at 25-meter resolution. In addition, adjacent to the fenceline, four tiers of 152 receptors were present, at 25-meter resolution, for a total of 41,789 receptors.

Specialized Modeling Analyses

Fumigation Modeling. Fumigation occurs when a stable layer of air lies a short distance above the release point of a plume and unstable air lies below. Under these conditions, an exhaust plume may be drawn to the ground, causing high ground-level pollutant concentrations. Although fumigation conditions rarely last as long as one hour, relatively high ground-level concentrations may be reached during that time. For this analysis, fumigation was assumed to occur for up to 90 minutes, per USEPA guidance.

The SCREEN3 model was used to evaluate maximum ground-level concentrations for short-term averaging periods (24 hours or less). Although this modeling analysis is not required by BAAQMD regulation, guidance from the BAAQMD staff (BAAQMD, 1998) and USEPA (USEPA, 1992) were followed in evaluating fumigation impacts. Since SCREEN3 is a single-source model, a single turbine was modeled and the results multiplied by three. The maximum fumigation impact from the turbines occurred approximately 19 kilometers from the facility. This analysis, which is shown in more detail in Appendix 8.1B, Table 8.1B-5, showed that impacts under fumigation conditions are expected to be lower than the maximum concentrations calculated by ISC under downwash conditions.

Shoreline Fumigation Modeling. Shoreline fumigation modeling is used to determine the impacts as a result of over-water plume dispersion. Because land surfaces tend to both heat and cool more rapidly than water, shoreline fumigation tends to occur on sunny days when the denser cooler air over water displaces the warmer, lighter air over land. During an inland sea breeze, the unstable air over land gradually increases in depth with inland distance. The boundary between the stable air over the water and the unstable air over the land and the wind speed determine if the plume will loop down before much dispersion of the pollutants has occurred.

SCREEN3 can examine sources within 3,000 meters of a large body of water, and was used to calculate the maximum shoreline fumigation impact. The model uses a stable onshore flow and a wind speed of 2.5 meters per second; the maximum ground-level shoreline fumigation concentration is assumed by the model to occur where the top of the stable plume intersects the top of the well-mixed thermal inversion boundary layer (TIBL). The model TIBL height was varied in accordance with BAAQMD procedures (between 2 and 6) to determine the highest shoreline fumigation impact. The worst-case (highest) impact was used in the determining facility impacts due to shoreline fumigation. Shoreline breakup fumigation was assumed to persist for up to 3 hours, in accordance with the meteorological data analysis performed by Dames and Moore for the Potrero 7 application. The shoreline fumigation modeling analysis is shown in more detail in Appendix 8.1B, Table 8.1B-6.

Turbine Startup. Facility impacts were also evaluated during the startup of three turbines simultaneously to evaluate short-term impacts under worst-case startup emissions. Emission rates used for this scenario were based on an engineering analysis of available data, which included source test data from startups of the LM6000PC combustion turbines at the Los Esteros Critical Energy Facility. Turbine exhaust parameters for 50-percent load operation (Cases 4, 5, and 6) were used to characterize turbine exhaust during startup and the CO and NO_x emission rates from Table 8.1-17 were used. Startup impacts were evaluated for the one-hour averaging period using the unit impact modeling results discussed earlier. The calculation of startup impacts is shown in Appendix 8.1B, Table 8.1B-3.

Ozone Limiting. Because the NO_x impacts during facility operation are shown by the modeling to be relatively low, it is assumed that no ozone limiting of NO_x emissions from project operation will occur and the results are reported without ozone correction for either the one-hour or annual impacts.

In accordance with guidance provided by the BAAQMD staff for similar projects, one-hour NO_2 impacts during construction were modeled using ISC3_OLM (Industrial Source Complex, Version 3, Ozone Limiting Method) Model (version 96113). While this version of

ISCST3 is not based on the latest model ISCST3 update, this modeling analysis does not include any features that were affected by recent model updates.

ISC3_OLM uses hourly ozone data to perform ozone-limiting calculations on individual plumes on an hour-by-hour basis. In accordance with guidance provided by the BAAQMD staff for similar projects, the concurrent ozone data collected at the nearest monitoring station to the SFERC, on Arkansas Street, were used for this analysis. Annual NO_x impacts during construction were modeled using ISCST3. NO_x impacts were converted to NO_2 using the USEPA-guidance Ambient Ratio Method and the nationwide default conversion rate of 0.75.

Turbine Commissioning. There are several high emissions scenarios possible during commissioning. The first is the period prior to SCR system and oxidation catalyst installation, when the combustor is being tuned. Under this scenario, NO_x emissions would be high because the NO_x emissions control system would not be functioning and because the combustor would not be tuned for optimum performance. CO emissions would also be high because combustor performance would not be optimized and the CO emissions control system would not be functioning. The second high emissions scenario may occur when the combustor has been tuned but the SCR and oxidation catalyst installation is not complete, and other parts of the turbine operating system are being checked out. Since the combustor would be tuned but the control system installation would not be complete, NO_x and CO levels would again be high. Commissioning activities and expected emissions are discussed in more detail below.

Preconstruction Monitoring. To ensure that the impacts from the SFERC combustion turbines will not cause or contribute to a violation of an ambient air quality standard or an exceedance of a PSD increment, an analysis of the existing air quality in the project area is necessary. If a source is subject to PSD review, BAAQMD rules require preconstruction ambient air quality monitoring data for the purposes of establishing background pollutant concentrations in the impact area (Regulation 2-2-414.3). However, a facility may be exempted from this requirement if the predicted air quality impacts of the facility do not exceed the de minimis levels listed in Table 8.1-21. As the SFERC is not subject to PSD review, the preconstruction monitoring requirements are not applicable to the project.

TABLE 8.1-21
BAAQMD PSD Preconstruction Monitoring Exemption Levels

Pollutant	Averaging Period	De minimis Level
CO	8-hr average	575 $\mu g/m^3$
PM_{10}	24-hr average	10 $\mu g/m^3$
NO_2	annual average	14 $\mu g/m^3$
SO_2	24-hr average	13 $\mu g/m^3$

With the BAAQMD's approval, a facility may rely on air quality monitoring data collected at BAAQMD monitoring stations to satisfy the requirement for preconstruction monitoring. In such a case, in accordance with Section 2.4 of the USEPA PSD guideline, the last three years of ambient monitoring data may be used if they are representative of the area's air quality where the maximum impacts occur due to the proposed source.

The background data need not be collected on site, as long as the data are representative of the air quality in the subject area (40 CFR 51, Appendix W, Section 9.2). Three criteria are applied in determining whether the background data are representative: (1) location, (2) data quality, and (3) data currentness (USEPA, 1987). These criteria are defined as follows:

- **Location:** The measured data must be representative of the areas where the maximum concentration occurs for the proposed stationary source, existing sources, and a combination of the proposed and existing sources.
- **Data quality:** Data must be collected and equipment must be operated in accordance with the requirements of 40 CFR Part 58, Appendices A and B, and PSD monitoring guidance.
- **Currentness:** The data are current if they have been collected within the preceding three years and they are representative of existing conditions.

Although the SFERP is not subject to PSD review and thus not required to follow this guidance, all of the data used in this analysis meet the requirements of Appendices A and B of 40 CFR Part 58, and thus all meet the criterion for data quality. All of the data have been collected within the preceding three years, and thus all meet the criterion for currentness.

Ambient NO_2, CO, SO_2, PM_{10} and $PM_{2.5}$ data are collected at the Arkansas Street monitoring station. This monitoring station is located less than 2 miles northwest of the project site. Ambient NO_2, CO, SO_2 and $PM_{2.5}$ data are also being collected at a monitoring station in Hunters Point, a little over 1 mile south of the project site. The ambient pollution levels monitored at the Arkansas Street and Hunters Point monitoring stations reflect concentrations in the vicinity of the project, and thus meet the criterion for location. CO levels are affected mainly by vehicle traffic, so CO concentrations monitored at both urbanized locations are expected to conservatively represent CO levels in the project area. There are no local sources of SO_2 in the vicinity of either monitoring station or the project site that would be expected to affect monitored concentrations. Therefore, both stations provide representative background data for assessing the SO_2 impacts of the project, and thus meet the location criterion.

Results of the Ambient Air Quality Modeling Analyses. The maximum facility impacts calculated from the ISCST3/CTSCREEN and fumigation modeling analyses described previously are summarized in Table 8.1-22. The highest modeled impacts are expected to occur under startup and shoreline fumigation conditions.

Even if the project were subject to PSD review, preconstruction monitoring would not be required because the maximum ambient impacts do not exceed de minimis levels, as shown in Table 8.1-23.

TABLE 8.1-22
Results of the Ambient Air Quality Modeling Analysis

Pollutant	Averaging Time	Modeled Concentration (μg/m3)			
		Normal Operation	Startup	Inversion Breakup Fumigation	Shoreline Fumigation
NO_2	1-hour	8.3	111.3	1.6	11.0
	Annual	0.1	[a]	–[c]	–[c]
SO_2	1-hour	0.8	[b]	0.2	1.1
	3-hour	0.6	[b]	0.2	1.0
	24-hour	0.1	[b]	0.05	0.1
	Annual	0.01	[b]	–[c]	–[c]
CO	1-hour	8.1	27.8	1.6	10.7
	8-hour	6.3	[a]	0.9	3.3
$PM_{2.5}$/PM_{10} (including cooling tower)[d]	24-hour	1.2	[b]	0.5	0.9
	Annual	0.2	[b]	–[c]	–[c]

Notes:

[a] Not applicable, because startup emissions are included in the 8-hour and longer-term ("Normal Operation") modeling.

[b] Not applicable, because emissions are not elevated above normal levels during startup.

[c] Not applicable, because inversion breakup and shoreline fumigation are short-term phenomena and as such are evaluated only for short-term averaging periods.

[d] Cooling tower not included in fumigation modeling.

TABLE 8.1-23
Evaluation of Preconstruction Monitoring Requirements

Pollutant	Averaging Time	Exemption Concentration (μg/m^3)	Maximum Modeled Concentration (μg/m^3)	Exceed Monitoring Threshold?
NO_x	annual	14	0.1	No
SO_2	24-hr	13	0.1	No
CO	8-hr	575	6.3	No
PM_{10}	24-hr	10	1.2	No

Impacts During Turbine Commissioning. As discussed previously, NO_2 and CO impacts could be higher during commissioning than under other operating conditions already evaluated. The commissioning period for the project is comprised of several equipment tests. These tests and the associated NO_x and CO emissions are briefly summarized below. The emissions calculations are shown in more detail in Appendix 8.1B, Table 8.1B-7.

- **Full Speed No Load Tests (FSNL)—**The tests include a test of the combustion turbine ignition system, a test to ensure that the CTG is synchronized with its electric generator, and a test of the CTG's overspeed system. During the tests, the heat input to the CTG will be approximately 100 MMBtu/hr or 20 percent of the maximum heat input rating. Worst-case NO_x emission concentrations are expected to be 100 ppm at 15-percent oxygen, or 35.3 lb/hr at 97 MMbtu/hr. Total operating time for these tests is expected to be about 4 hours per unit (12 hours total), resulting in maximum total NO_x emissions of 424 pounds. Maximum CO emissions are assumed to be 120 ppm at 15-percent oxygen, or 25.7 lb/hr at 97 MMbtu/hr, for a total of 308 pounds CO for the period.

- **Minimum Load Tests**—These tests will occur over several days. During this testing period the CTG combustor water injection rates will be tuned to minimize emissions and steam line checks will be performed. This test period will allow for complete combustion path warm-up, required for removing all debris that could potentially damage the SCR and CO catalysts. During the tests, the heat input to the combustion turbine will be approximately 100 MMBtu/hr or 20 percent of the maximum heat input rating. The average NO_x emission concentration for the period is assumed be 42 ppm at 15-percent oxygen (due to water injection control) at a heat input of 97 MMBtu/hr, or 15 lb/hr NO_x. Total testing is estimated to last approximately 20 hours per unit, or 60 hours, for a total of 900 pounds of NO_x. The worst case CO emission rate is assumed to be equivalent to 17 times the controlled emission rate (14.6 lb/hr), for a total of 876 pounds CO for the period.
- **Full Speed, No Load Tests (SCR Not Operational)**—These tests will occur over approximately a 4-day period. By the beginning of this test period, the water injection at the CTG combustor will be completely tuned. The SCR and CO catalyst will be installed during this testing period, but no ammonia will be injected. During the tests, the heat input to the CTG will be approximately 100 MMBtu/hr or 20 percent of the maximum heat input rating. Testing and commissioning of the spray water (SPRINT) power augmentation system on the CTG combustor will also take place during this second FSNL test. The average NO_x emission concentration for the period is assumed be 30 ppm at 15-percent oxygen (water injection control) at 100 MMBtu/hr, or 35.3 lb/hr NO_x. Total testing is estimated to last up to 24 hours for each CTG, for a total of approximately 2,550 pounds of NO_x from all three units. Again, the worst-case CO emission rate is assumed to be equivalent to 17 times the controlled emissions (25.7 lb/hr), for a total of approximately 1,850 pounds of CO for the period.
- **Multiple Load Tests (SCR and Oxidation Catalyst Fully Operational)**—These tests will occur over approximately a 13-day period. By the beginning of this test period the control systems will be completely tuned and achieving NO_x and CO control at design levels. During the tests, the heat input to each combustion turbine will be approximately 487.3 MMBtu/hr or 100 percent of the maximum heat input rating.

Total heat rate will vary between about 10,000 Btu/kWh and 14,000 Btu/kWh (HHV) during commissioning activities. Average heat rate for the entire commissioning period is expected to be about 10,000 Btu/kWh to 12,000 Btu/kWh (HHV).

The maximum modeled NO_2 and CO impact during commissioning will occur under the turbine operating conditions that are least favorable for dispersion. As shown in the unit impacts analysis, these conditions are expected to occur under part-load, high-temperature conditions (Case 6).

The unit impact modeling results for three turbines emitting 1 g/s each under Case 6 (see Appendix 8.1B, Table 8.1B-3) can be scaled using a NO_x emission rate of 4.45 g/s (35.3 lb/hr) to determine that the maximum modeled 1-hour NO_2 impact during commissioning of three turbines is not expected to exceed approximately 98 μg/m³. Using the background NO_2 concentration of 141 μg/m³, the total impact will not exceed 239 μg/m³, which is well below the state one-hour NO_2 standard of 470 μg/m³. The turbine screening results can also be scaled to determine that maximum 1-hour CO impacts during commissioning of three turbines are not expected to exceed 72 μg/m³. Combined with the background concentration of 5,000 μg/m³, the total impact will not exceed 5,072 μg/m³, which is well below the state 1-hour CO standard of 23,000 μg/m³.

No additional mitigation will be necessary during the commissioning period. The SFERP air permit and conditions of certification will require that all emissions during commissioning must accrue toward the rolling 12-month emissions limits that will be included in the permit. As offsets and mitigation will be provided for permitted annual emissions, there will be no excess unmitigated emissions from the project during commissioning.

Ambient Air Quality Impacts. To determine a project's air quality impacts, the modeled concentrations are added to the maximum background ambient air concentrations and then compared to the applicable ambient air quality standards. The modeled concentrations have already been presented in earlier tables. The maximum background ambient concentrations are listed in the following text and tables. A detailed discussion of why the data collected at these stations are representative of ambient concentrations in the vicinity of the project was provided in preceding discussions.

Table 8.1-24 presents the maximum concentrations of NO_X, CO, SO_2, PM_{10} and $PM_{2.5}$ recorded between 2001 through 2003 from the Arkansas Street monitoring station,[1] and the available data from the Hunters Point monitoring station.

TABLE 8.1-24
Maximum Background Concentrations, 2001-2004 (μg/m³)

Pollutant	Averaging Period	Arkansas Street Monitoring Station 2001	2002	2003	Hunters Point Monitoring Station 2004[a]
NO_2	1-hour	137	141	135	88
	Annual	36	36	34	n/a
SO_2	1-hour	65	138	62	78
	3-hour	44	52	44	70
	24-hour	21.0	18.4	18.4	28.9
	Annual	5.3	5.3	5.3	n/a
CO	1-hour	5,000	4,375	4,500	1,125
	8-hour	3,644	2,856	3,156	778
PM_{10}	24-hour	67	74	51	36
	Annual	26.3	24.7	22	22
$PM_{2.5}$	24-hour	51	58	33	n/a
	Annual	11.5	13.1	10.1	

Note:
[a] Partial year (June through December).

[1] Complete 2004 monitoring results for the Arkansas Street are not yet available.

Maximum ground-level impacts due to operation of the SFERP are shown together with the ambient air quality standards in Table 8.1-25. Using the conservative assumptions described earlier, the results indicate that the SFERP will not cause or contribute to violations of any state or federal air quality standards, with the exception of the state PM_{10} and state and federal $PM_{2.5}$ standards. For these pollutants, existing concentrations already exceed the state standards.

TABLE 8.1-25
Modeled Maximum Impacts from Facility

Pollutant	Averaging Time	Maximum Facility Impact (μg/m^3)	Background (μg/m^3)	Total Impact (μg/m^3)	State Standard (μg/m^3)	Federal Standard (μg/m^3)
NO_2	1-hour	111.3[a]	141	252	470	–
	Annual	0.1	36	36	–	100
SO_2	1-hour	1.1	138	139	655	–
	3-hour	1.0	70	71	–	1,300
	24-hour	0.1	29	29	105	365
	Annual	0.01	5.3	5.3	–	80
CO	1-hour	27.8	5,000	5,028	23,000	40,000
	8-hour	6.3	3,644	3,650	10,000	10,000
PM_{10}	24-hour	1.2	74	75	50	150
	Annual	0.2	26.3	26.5	20	50
$PM_{2.5}$	24-Hour	1.2	58	59	–	65
	Annual	0.2	13.1	13.3	12	15

[a] Maximum 1-hour NO_2 impact shown occurs only during simultaneous startup of three turbines. Maximum impact during routine turbine operation will be approximately 8.3 μg/m^3.

PSD Increment Consumption. The Prevention of Significant Deterioration (PSD) program was established to allow emission increases (increments of consumption) that do not result in significant deterioration of ambient air quality in areas where criteria pollutants have not exceeded the National Ambient Air Quality Standards (NAAQS). For the purposes of determining applicability of the PSD program requirements, the following regulatory procedure is used:

- SFERP facility-wide emissions are compared with regulatory significance thresholds to determine whether the facility is major and thus may be subject to PSD. If the facility emissions exceed these thresholds, it is a major facility. The comparison in Table 8.1-26 indicates that the SFERP will not be a major facility and thus is not subject to PSD.
- If an ambient impact analysis is required, the analysis is first used to determine if the impact levels are significant. The determination of significance is based on whether the impacts exceed established significance levels (BAAQMD Rule 2.2-233) shown in Table 8.1-27. If the significance levels are not exceeded, no further analysis is required.
- If the significance levels are exceeded, an analysis is required to demonstrate that the allowable increments will not be exceeded, on a pollutant-specific basis. Increments are the maximum increases in concentration that are allowed to occur above the baseline concentration. These PSD increments are also shown in Table 8.1-27.

Table 8.1-26 shows that the proposed project will not be a major stationary source and will not be subject to PSD review because facility emissions of all pollutants are below the 100-tpy major facility and the PSD significance thresholds.

TABLE 8.1-26
PSD Significant Emissions Levels

Pollutant	Facility Emissions (tpy)	PSD Threshold (tpy)	Significant?
NO_X	39.8	250	No
SO_2	2.7	250	No
POC	7.7	250	No
CO	27.9	250	No
PM_{10}[a]	18.2	250	No

[a] PM_{10} emissions shown include cooling tower.

TABLE 8.1-27
BAAQMD PSD Levels of Significance

Pollutant	Averaging Time	Significant Impact Levels	Maximum Allowable Increments
NO_2	1-Hour Annual	19 $\mu g/m^3$ 1 $\mu g/m^3$	N/A[a] 25 $\mu g/m^3$
SO_2	3-hour 24-Hour Annual	25 $\mu g/m^3$ 5$\mu g/m^3$ 1 $\mu g/m^3$	512 $\mu g/m^3$ 91 $\mu g/m^3$ 20 $\mu g/m^3$
CO	1-Hour 8-Hour	2,000 $\mu g/m^3$ 500 $\mu g/m^3$	N/A N/A
PM_{10}	24-Hour Annual	5 $\mu g/m^3$ 1 $\mu g/m^3$	30 $\mu g/m^3$ 17 $\mu g/m^3$

[a] The significance level for 1-hour average NO_2 is a BAAQMD level only; there is no corresponding federal significance level.

The maximum modeled impacts from the SFERP facility are compared with the significance levels in Table 8.1-28. These comparisons show that the proposed project exceeds only the BAAQMD 1-hour average NO_2 significance level, and only during startup of three turbines simultaneously. During routine plant operations, maximum one-hour NO_2 concentrations will be below the BAAQMD significance threshold. As discussed previously, however, the project emissions are below levels that would trigger PSD review either by USEPA or by the BAAQMD, so no further analysis of modeled impacts is required.

TABLE 8.1-28
Comparison of Maximum Modeled Impacts and PSD Significance Thresholds

Pollutant	Averaging Time	Maximum Modeled Impacts (μg/m3)	Significance Threshold (μg/m3)	Significant?
NO_2	1-Hour Annual	111.3 0.1	19 1	yes no
SO_2	3-Hour 24-Hour Annual	1.0 0.1 0.01	25 5 1	no no no

TABLE 8.1-28
Comparison of Maximum Modeled Impacts and PSD Significance Thresholds

Pollutant	Averaging Time	Maximum Modeled Impacts (μg/m3)	Significance Threshold (μg/m3)	Significant?
CO	1-Hour	27.8	2,000	no
	8-Hour	6.3	500	no
PM_{10}	24-Hour	1.2	5	no
	Annual	0.2	1	no

[a] NO_2 impact shown occurs only during the startup of three turbines simultaneously. Under typical operating conditions, 1-hour average NO_2 concentration will be 8.3 $\mu g/m^3$.

8.1.5.5 Screening Health Risk Assessment

The screening health risk assessment (SHRA) was conducted to determine expected impacts on public health of the noncriteria pollutant emissions from the facility. The SHRA was conducted in accordance with the California Office of Environmental Health Hazard Assessment (OEHHA) Air Toxics "Hot Spots" Program Risk Assessment Guidelines (June 2002) and the BAAQMD "Risk Management Procedure" Policy (May 1991). The SHRA estimated the offsite cancer risk to the maximally exposed individual (MEI), as well as indicated any adverse effects of non-carcinogenic compound emissions. The CARB/OEHHA HARP computer program was used to evaluate multipathway exposure to toxic substances. Because of the conservatism (overprediction) built into the established risk analysis methodology, the actual risks will be lower than those estimated.

A health risk assessment requires the following information:

- Carcinogenic potency values for any carcinogenic substances that may be emitted
- Noncancer Reference Exposure levels (RELs) for determining non-carcinogenic health impacts
- One-hour and annual average emission rates for each substance of concern
- The modeled maximum offsite concentration of each of the pollutants emitted

The SHRA uses carcinogenic potency factors specified by the California OEHHA. All of the pollutant cancer risks are assumed to be additive.

An evaluation of the potential noncancer health effects from long-term (chronic) and short-term (acute) exposures has also been included in the SHRA. Many of the carcinogenic compounds are also associated with noncancer health effects and are therefore included in the determination of both cancer and noncancer effects. RELs are used as indicators of potential adverse health effects. RELs are generally based on the most sensitive adverse health effect reported and are designed to protect the most sensitive individuals. However, exceeding the REL does not automatically indicate a health impact. The OEHHA reference exposure levels were used to determine any adverse health effects from noncarcinogenic compounds. A hazard index for each noncancer pollutant is then determined by the ratio of the pollutant annual average concentration to its respective REL for a chronic evaluation. The individual indices are summed to determine the overall hazard index for the project.

Because noncancer compounds do not target the same system or organ, this sum is considered conservative. The same procedure is used for the acute evaluation.

The SFERP SHRA results are compared with the established risk management procedures for the determination of acceptability. The established risk management criteria provides that if the potential increased cancer risk is less than one in a million, the facility risk is considered not significant.

The SHRA includes the noncriteria pollutants listed in Table 8.1-22. The receptor grid described earlier for criteria pollutant modeling was used for the SHRA. The SHRA results for the SFERP are presented in Table 8.1-29, and the detailed calculations are provided in Appendix 8.1C. The locations of the maximum modeled risks are shown in Figure 8.1C-1.

TABLE 8.1-29
Screening Health Risk Assessment Results

Cancer Risk to Maximally Exposed Individual[a]	0.046 in one million
Cancer Risk at Nearest Residence[b]	0.0008 in one million
Cancer Risk at Nearest Workplace	0.0001 in one million
Acute Inhalation Hazard Index	0.03
Chronic Inhalation Hazard Index	0.002

[a] Value shown reflects high-end point estimate. 70-year cancer risk estimates range from 0.022 in one million to 0.046 in one million.

[b] Value shown reflects high-end point estimate.

The screening HRA results indicate that the acute and chronic hazard indices are well below 1.0, so, pursuant to established risk management criteria, are not significant. The cancer risk to a maximally exposed individual is 0.05 in one million, well below the one in one million level. The screening HRA results indicate that, overall, the SFERP project will not pose a significant health risk at any location.

8.1.5.6 Construction Impacts Analysis

Emissions due to the construction phase of the project have been estimated, including an assessment of emissions from vehicle and equipment exhaust and the fugitive dust generated from material handling. A dispersion modeling analysis was conducted based on these emissions. A detailed analysis of the emissions and ambient impacts is included in Appendix 8.1D. The results of the analysis indicate that the maximum construction impacts will be below the state and federal standards for all the criteria pollutants emitted. The best available emission control techniques will be used, including dust reduction measures set forth in the Environmental Code, Chapter 10 and in Department of Public Works Order 171,378 during construction. The SFERP construction site impacts are not unusual in comparison to most construction sites; construction sites that use good dust-suppression techniques and low-emitting vehicles typically do not cause violations of air quality standards.

Combustion Diesel PM_{10} emission impacts have also been evaluated. This risk screening analysis is also included in Appendix 8.1D.

8.1.6 Consistency with Laws, Ordinances, Regulations and Standards

8.1.6.1 Consistency with Federal Requirements

The BAAQMD has been delegated authority by the USEPA to implement and enforce most federal requirements that may be applicable to the SFERP, including the new source performance standards and new source review for nonattainment pollutants. Compliance with the BAAQMD regulations ensures compliance and consistency with the corresponding federal requirements as well. The SFERP will also be required to comply with the Federal Acid Rain requirements (Title IV). Since the BAAQMD has received delegation for implementing Title IV through its Title V permit program, the SFERP will secure a BAAQMD Title V permit that imposes the necessary requirements for compliance with the Title IV Acid Rain provisions.

8.1.6.2 Consistency with State Requirements

State law sets up local air pollution control districts and air quality management districts with the principal responsibility for regulating emissions from stationary sources. As discussed previously, the SFERP is under the local jurisdiction of the BAAQMD, and compliance with BAAQMD regulations will ensure compliance with state air quality requirements.

8.1.6.3 Consistency with Local Requirements: Bay Area Air Quality Management District

The BAAQMD has been delegated responsibility for implementing local, state, and federal air quality regulations in portions of the nine counties surrounding San Francisco Bay. The SFERP project is subject to BAAQMD regulations that apply to new sources of emissions, to the prohibitory regulations that specify emission standards for individual equipment categories, and to the requirements for evaluation of impacts from toxic air pollutants. The following sections include the evaluation of facility compliance with the applicable BAAQMD requirements.

Under the regulations that govern new sources of emissions, the SFERP is required to secure a preconstruction Determination of Compliance from the BAAQMD (Regulation 2, Rule 3), as well as demonstrate continued compliance with regulatory limits when the facility becomes operational. The preconstruction review includes demonstrating that the combustion turbines will use best available control technology (BACT) and will provide any necessary emission offsets.

Applicable BACT levels are shown in Table 8.1-30, along with anticipated potential facility emissions. BAAQMD Rule 2-2-301 requires the SFERP to apply BACT to any source that has an increase in emissions of NO_x, POC, SO_x, CO, and PM_{10} (criteria pollutants) and that has a potential to emit in excess of 10.0 pounds per highest day. Rule 2.2-301.2 imposes BACT for emissions of lead, asbestos, beryllium, mercury, fluorides, sulfuric acid mist, hydrogen sulfide, total reduced sulfur, and reduced sulfur compounds when emitted in excess of specified amounts. The SFERP facility will not emit any of these latter pollutants in detectable quantities; therefore, Rule 2-2-301.2 is not applicable to the proposed project. As shown in the table, BACT is required for NO_x, POC, SO_2, CO, and PM_{10}. The calculation of facility emissions was discussed in AFC Section 8.1.5.1.1.

TABLE 8.1-30
Facility Best Available Control Technology Requirements

Pollutant	Applicability Level	Facility Emission Level (lbs/day)	BACT Required?
Criteria Pollutants: BAAQMD Regulation 2-2-301.1			
POC	10 lbs/day	97.8	yes
NPOC	10 lbs/day	–	no
NO_x	10 lbs/day	744.6	yes
SO_2	10 lbs/day	32.3	yes
PM_{10}	10 lbs/day	216.9	yes
CO	10 lbs/day	378.0	yes
Noncriteria Pollutants: BAAQMD Regulation 2-2-301.2			
Lead	3.2 lbs/day	neg.	no
Asbestos	0.04 lbs/day	neg.	no
Beryllium	0.002 lbs/day	neg.	no
Mercury	0.5 lbs/day	neg.	no
Fluorides	16 lbs/day	neg.	no
Sulfuric Acid Mist	38 lbs/day	neg.	no
Hydrogen Sulfide	55 lbs/day	neg.	no
Total Reduced Sulfur	55 lbs/day	neg.	no
Reduced Sulfur Compounds	55 lbs/day	neg.	no

BACT for the applicable pollutants was determined by reviewing the BAAQMD BACT Guidelines Manual, the South Coast Air Quality Management District BACT Guidelines Manual, the most recent Compilation of California BACT Determinations, CAPCOA (2^{nd} Ed., November 1993), and USEPA's BACT/LAER Clearinghouse. A summary of the review is provided in Appendix 8.1E. For the combustion turbines, the BAAQMD considers BACT to be the most stringent level of demonstrated emission control that is feasible. The SFERP facility will use the BACT measures discussed next.

As a BACT measure, the SFERP will limit the fuels burned in the new combustion turbines to natural gas, a clean-burning fuel. Burning of liquid fuels in the combustion turbine combustors would result in greater criteria pollutant emissions than if the units burned only gaseous fuels. This measure acts to minimize the formation of all criteria air pollutants.

BACT for NO_x emissions from the combustion turbines will be the use of low NO_x emitting equipment and add-on controls. The SFERP will use a selective catalytic reduction (SCR) system to reduce NO_x emissions to 2.5 ppmvd NO_x, corrected to 15 percent O_2 on a three-hour average basis. The BAAQMD BACT guidelines indicate that BACT from large, simple-cycle combustion turbines (≥40 MMBtu/hr heat input) is an exhaust concentration of

2.5 ppmvd NO_x, corrected to 15 percent O_2; therefore, the proposed combustion turbines will meet the BACT requirements for NO_x. The BAAQMD BACT Guideline determination for NO_x from combustion turbines is shown in Appendix 8.1E.

BACT for CO emissions will be achieved by using oxidation catalysts to reduce CO emissions to 4.0 ppmvd, corrected to 15 percent O_2. Recent BAAQMD BACT determinations indicate that BACT from large, simple-cycle combustion turbines (≥40 MMBtu/hr heat input) is 6 ppmvd CO, corrected to 15 percent O_2. A review of recent BACT determinations for CO from combustion turbines is provided in Appendix 8.1E.

BACT for POC emissions will be achieved by use of good combustion practices in the combustion turbines. BACT for POC emissions from combustion devices has historically been the use of best combustion practices. POC emissions leaving the stacks will not exceed 2.0 ppmvd, corrected to 15 percent oxygen. This level of emissions is consistent with recent BACT determinations for similar projects.[2]

For the turbines, BACT for PM_{10} is best combustion practices and the use of gaseous fuels. BAAQMD BACT Guideline 89.1.6 specifies BACT 2 (achieved in practice) for SO_2 for combined cycle combustion turbines with an output rating of ≥ 50 MW as the exclusive use of clean-burning natural gas with a sulfur content of < 1.0 grains per 100 scf. The proposed turbines will burn exclusively PUC-regulated natural gas with an expected average sulfur content of 0.33 grains per 100 scf, which will result in minimal SO_2 emissions.

In addition to the BACT requirements, BAAQMD regulation 2-2-302 requires the project to provide full emission offsets when emissions exceed specified levels on a pollutant-specific basis. As shown in Table 8.1-31, the SFERP will be required to provide emission offsets for NO_x emissions.

TABLE 8.1-31
BAAQMD Offset Requirements and Facility Emissions

Pollutant	Applicable Facility Size	Emission Increase	Facility Emissions	Regulation	Offsets Required
POC	10 tpy	Any increase	7.7 tpy	2-2-302	No
NO_x	10 tpy	Any increase	39.8 tpy	2-2-302	Yes
PM_{10}	100 tpy	1 tpy net increase	18.2 tpy	2-2-303	No
SO_2	100 tpy	1 tpy net increase	2.7 tpy	2-2-303	No

Section 2-302 requires NO_x emission reduction credits to be provided at an offset ratio of 1.15:1 because facility emissions will exceed 35 tpy. POC offsets are not required because facility POC emissions are less than 10 tpy. Both POC and NO_x contribute to the Bay Area Air Basin ozone levels. As discussed further on, the SFERP is proposing to provide 47.5 tons of NO_x offsets, resulting in an effective offset ratio of 1.19:1. As shown in Table 8.1-32 below, the 47.5 tons of NO_x ERCs that are being provided will be adequate to mitigate all of the ozone precursor emissions from the project at a ratio of 1.0:1.

Section 2-303 requires offsets for emissions increases at facilities that emit more than 100 tpy of SO_2 and PM_{10}. As facility emissions of SO_2 and PM_{10} will be below 100 tpy, offsets are not

[2] Although the turbines will be equipped with oxidation catalysts, no POC control effectiveness has been assumed.

required for these pollutants. As shown in Table 8.1-31, the maximum SO_2 and PM_{10} impacts from the proposed project are well below the significance thresholds so are not considered significant, and no mitigation is necessary under BAAQMD rules.

Sections 2-304 and 2-305 impose emissions offset requirements, or require project denial, if SO_2, NO_2, PM_{10}, or CO air quality modeling results indicate emissions will interfere with the attainment or maintenance of the applicable ambient air quality standards or will exceed PSD increments. As discussed above, BAAQMD regulations do not require the SFERP to conduct these analyses, since the facility is not subject to PSD review and is not a major source. However, modeling for these pollutants has been conducted to satisfy CEC requirements. The modeling analyses show that facility emissions will not interfere with the attainment or maintenance of the applicable air quality standards.

Emissions offset requirements for NO_x and POC are shown in Table 8.1-32. SFPUC has signed an option agreement for the purchase of sufficient ERCs from Certificate No. 896 to provide the necessary offsets for the project.

TABLE 8.1-32
Facility Offset Requirements

Pollutant	Net Increase in Emissions (tpy)	Required Offset Ratio	Offsets Required (tpy)	Offsets to be Provided (tpy)	Effective Offset Ratio
NO_x	39.8	1.15:1	45.77	47.5	1.19:1
POC	7.7	N/A	0	0	N/A
Total (NO_x + POC)	47.5	N/A	N/A	47.5	1.0:1
NO_X ERCs optioned from Certificate No. 896	--	--	--	47.5	--

As discussed in AFC Section 8.1.4, Regulatory Setting, the BAAQMD PSD program requirements apply on a pollutant-specific basis to:

- A new major facility that will emit 100 tpy or more, or a major modification to an existing major facility
- A facility that emits 100 tpy or more, with net emissions increases since the applicable PSD baseline date that exceed the modeling threshold levels shown in Table 8.1-33

The SFERP will not be a major source. Therefore, it is not subject to the USEPA and BAAQMD PSD regulations. The BAAQMD modeling threshold requirements and their applicability to the proposed project are shown in Table 8.1-33.

Rule 2-2-308 requires applicants to demonstrate that emissions from a project located within 10 kilometers (6.2 miles) of a Class I area will not cause or contribute to the exceedance of any national ambient air quality standard or any applicable Class I PSD increment. Because the nearest Class I areas, Point Reyes National Seashore and Pinnacles National Park, are farther than 10 km from the SFERP, this section is not applicable to the proposed facility.

TABLE 8.1-33
BAAQMD PSD Requirements Applicable to 100 tpy Fossil Fuel Fired Power Plants

Pollutant	PSD Facility Applicability Level	Modeling Threshold Level	Emissions from New Facility	Modeling Required	Applicable BAAQMD Regulation
NO_X	100 tpy	100 tpy	39.8 tpy	No	2-2-304.2
SO_2	100 tpy	100 tpy	2.7 tpy	No	2-2-304.2
PM_{10}[a]	100 tpy	100 tpy	18.2 tpy	No	2-2-304.3
CO	100 tpy	100 tpy	27.9 tpy	No	2-2-305.1
POC	100 tpy	not required	7.7 tpy	–	–

[a] All particulate matter from the combustion turbines is assumed to be emitted as PM_{10}.

Rule 2-2-306 is also not applicable to the SFERP. This section requires modeling analyses for specific noncriteria pollutants (lead, asbestos, beryllium, mercury, fluorides, sulfuric acid mist, hydrogen sulfide, total reduced sulfur, and reduced sulfur compounds) if they are emitted in significant quantities and if the facility emits more than 100 tons per year of any criteria pollutant. As the project is not a major source and will not emit significant quantities of the specific noncriteria pollutants, a noncriteria pollutant modeling analysis under this section is not required. However, a screening health-risk assessment has been conducted for potential emissions of toxic air contaminants. The analysis methodology and results are discussed in Subsection 8.1.5.4.

Rule 2-2-418 requires the use of Good Engineering Practices (GEP) stack height. Conformance with the GEP stack height requirement was demonstrated in the modeling analysis conducted for the proposed project.

Regulation 2, Rule 6, Major Facility Review (Title V permit program), applies to major facilities and phase II acid rain facilities. Although the project is not a major facility, it is a phase II acid rain facility. Under the Title V permit program, the SFERP will be required to file an application for an operating permit within 12 months of facility startup. The Phase II acid rain requirements will also apply to the SFERP. As a Phase II Acid Rain facility, the SFERP will be required to provide sufficient allowances for every ton of SO_2 emitted during a calendar year. The SFERP will obtain the necessary allowances on the current open trade market. The SFERP will also be required to install and operate continuous monitoring systems; BAAQMD enforcement of its rules will ensure installation of these systems.

The general prohibitory rules of the BAAQMD applicable to the proposed project and the determination of compliance follow.

Regulation 1-301 addresses public nuisance. The new facility will emit insignificant quantities of odorous or visible substances; therefore, the project will comply with this regulation.

Regulation 6 pertains to particulate matter and visible emissions. Any visible emissions from the project will not be darker than No. 1 when compared to a Ringelmann Chart for any period(s) aggregating 3 minutes in any hour. Because the new turbines will burn clean fuels, the opacity standard of not greater than 20 percent for a period or periods aggregating

3 minutes in any hour and the particulate emission concentrations limit of 0.15 grains per standard cubic feet of exhaust gas volume will not be exceeded.

Regulation 7, Odorous Substances, is not applicable to the proposed project. Combustion turbine operations do not result in odor complaints.

Regulation 9, Rule 1, Sulfur Dioxide, specifies an emission standard of less than 300 ppm SO_2. Because of the insignificant quantities of sulfur in natural gas, this limit will be achieved. In addition, the ambient air quality modeling analysis discussed in Subsection 8.1.5.3.1 shows that ground-level concentrations of SO_2 from the proposed project will not result in ground-level concentrations in excess of 0.5 ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours.

Regulation 9, Rule 2, pertains to hydrogen sulfide. The combustion turbines are not expected to emit H_2S.

Regulation 9, Rule 3, Nitrogen Oxides From Heat Transfer Operations, imposes a NO_x limit of 125 ppm. The proposed project will easily comply with this rule.

Regulation 9, Rule 9, limits the emissions of nitrogen oxides from combustion turbines during baseload operations to less than 9 ppmv corrected to 15 percent O_2. The proposed NO_x level of 2.5 ppmvd, corrected to 15 percent O_2, will satisfy the requirements of this rule. In addition, the continuous emission monitoring (CEM) system that the SFERP will install will also satisfy the monitoring and recordkeeping requirements of this rule.

BAAQMD Regulation 10 (40 CFR 60 Subpart GG) adopts by reference the federal New Source Performance Standards (NSPS) for stationary gas turbines. This regulation requires monitoring of fuel; imposes limits on the emissions of NO_x, SO_2, and PM_{10}; and requires source testing of stack emissions, process monitoring, and data collection and recordkeeping. All of the BACT limits imposed on the new turbines will be more stringent than the requirements of the NSPS emission limits. Monitoring and recordkeeping requirements for BACT will be more stringent than the requirements in this rule. The SFERP will comply with the NSPS regulations.

8.1.6.4 Consistency with San Francisco Board of Supervisors Ordinance No. 124-01 and Resolutions No. 827-02 and 458-03

In May 2001 the San Francisco Board of Supervisors adopted Ordinance No. 124-01. This ordinance adopts minimum requirements for the protection of human health and the environment for any proposed new electric generation at the Potrero Power Plant and requires approval by the Board of Supervisors for any agreement by City officials or departments for or related to new electrical generation in Southeast San Francisco. The ordinance calls for the Board to work with the SFPUC and the Department of the Environment to adopt a new electricity resource plan for San Francisco. The Board has also adopted Resolution No. 827-02, which adopted the Electricity Resource Plan prepared by the SFPUC and ENV as policy guidelines, and Resolution No. 458-03, which opposes the Potrero Unit 7 power plant project. Section 3, Purpose and Need and Section 4, Environmental Justice describe how the project meets the requirements of these Ordinances and Resolutions. The project facilitates the closure of existing, dirty within-City generation while maintaining electrical reliability and is designed to minimize its impact on the community in Southeast San Francisco. Also, the City is developing, with community input, a PM_{10} mitigation/community benefits package and will target the mitigation to the areas affected by the impacts from the project. Moreover, project financing and key contracts are subject to approval by the Board of Supervisors.

8.1.7 Cumulative Air Quality Impacts Analysis

An analysis of potential cumulative air quality impacts that may result from the proposed combustion turbines and other reasonably foreseeable projects is generally required only when project impacts are significant.

To ensure that potential cumulative impacts of the SFERP and other nearby projects are adequately considered, a cumulative impacts analysis has been conducted and is included as Appendix 8.1F.

8.1.8 Mitigation

Mitigation will be provided for all emissions increases from the project in the form of offsets and the installation of BACT, as required under BAAQMD regulations. For PM_{10}, applicant is working with the community to develop a mitigation plan.

The process to develop the plan, and the measures that have been identified as most promising to date, are described in further detail in Section 4, Environmental Justice.

8.1.9 References

AVER. 1978.

Bay Area Air Quality Management District (BAAQMD). 1998. BAAQMD draft comments on Calpine's September 21, 1998, modeling protocol for the Delta Energy Center Project. October 22.

California Air Resources Board (CARB). 1989. Reference Document for California Statewide Modeling Guideline. April.

California Air Resources Board (CARB). 1997. Emission Inventory Criteria and Guidelines Report for the Air Toxics "Hot Spots" Program. May 15.

California Air Resources Board (CARB). 1999. Proposed Guidance for Power Plant Siting and Best Available Control Technology. June 23.

California Air Resources Board (CARB). 2003. HARP User Guide. December.

California Air Resources Board (CARB). 2003a. Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk. June.

California Air Resources Board (CARB). 2004. Report to the Legislature: Gas-Fired Power Plant NO_x Emission Controls And Related Environmental Impacts. May.

California Air Resources Board (CARB). 2005. http://www.arb.ca.gov/adam

CAPCOA. 1993. Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines. October.

City of San Francisco. 2005. San Francisco Convention and Visitors Bureau website, http://www.sfvisitor.org/visitorinfo/html/weatherforecast.html

NAPPO, et al. 1982. Workshop on the Representativeness of Meteorological Observations.

Office of Environmental Health Hazard Assessment (OEHHA). 2002. Air Toxics Hot Spots Program Risk Assessment Guidelines. Part II. Technical Support Document for Describing Available Cancer Potency Factors. December.

Office of Environmental Health Hazard Assessment (OEHHA). 2003. Adoption of Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. October.

Office of Environmental Health Hazard Assessment (OEHHA). 2004. Acute and Chronic Exposure Levels. October.

Dames and Moore. 2000. Application for Certification, Potrero Power Plant Unit 7 Project: Section 8.1, Air Quality, and Appendix F, Air Quality Data and Modeling Protocol, May.

San Francisco Public Utilities Commission (SFPUC). 2003. "SFPUC, San Francisco Electric Reliability Power Project. Final Modeling Protocol." November.

Smith, T. B., W. D. Sanders, and D. M. Takeuchi. 1984. Application of Climatological Analysis to Minimize Air Pollution Impacts in California, Final Report on CARB Agreement A2-119-32. August.

South Coast Air Quality Management District. 1998. "Risk Assessment Procedures for Rules 1401 and 212," Version 4.1, November.

U.S. Department of Commerce, Weather Bureau. 1959. "Climate of the States—California," December.

USEPA. 1985. Guideline for Determination of Good Engineering Practice Stack Height. June.

USEPA. 1987. Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD), USEPA-450/4-87-007. May.

USEPA. 1992. Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised, USEPA-454/R-92-019. October.

USEPA. 1995. On-Site Meteorological Program Guidance for Regulatory Model Applications, USEPA-450/4-87-013. August.

USEPA. 1999. Guideline on Air Quality Models, 40 CFR, Part 51, Appendix W. July 1.

USEPA. 2000. Compilation of Emission Factors. AP-42. Revised July.

USEPA. 2005. www.epa.gov.

Figure 8.1-1
January Predominant Mean Circulation of the Surface Winds

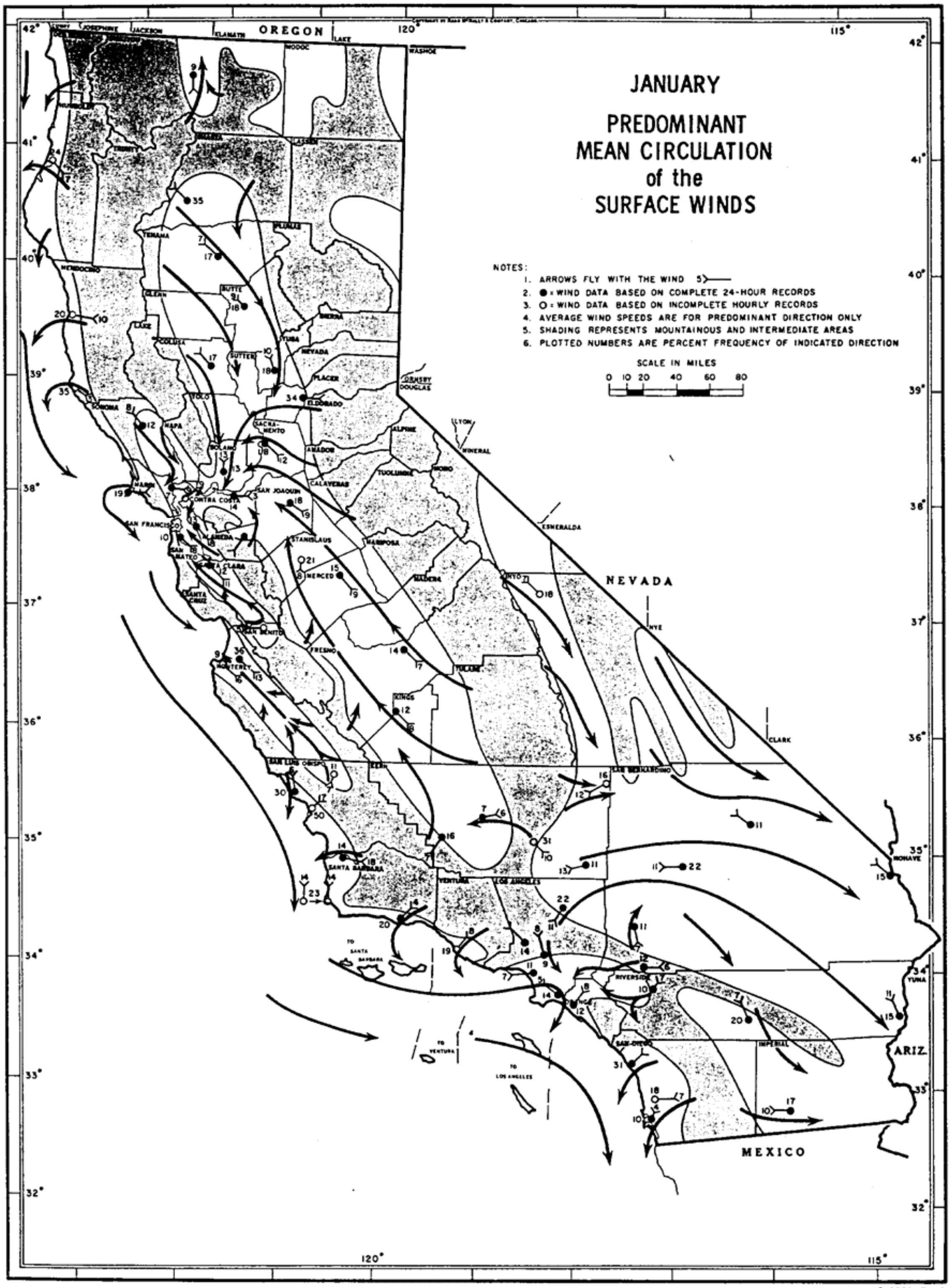


Figure 8.1-2
April Predominant Mean Circulation of the Surface Winds

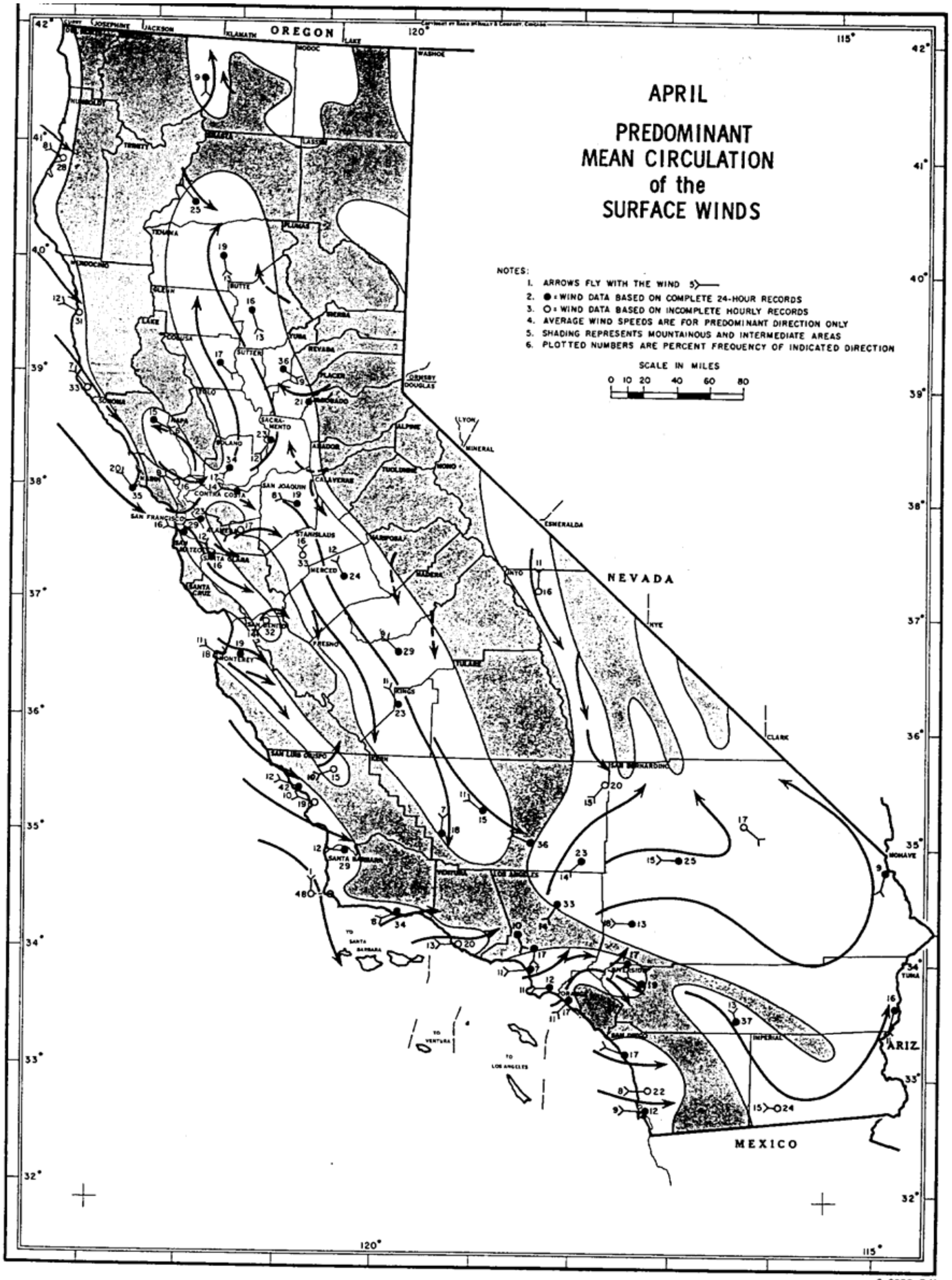


Figure 8.1-3
July Predominant Mean Circulation of the Surface Winds

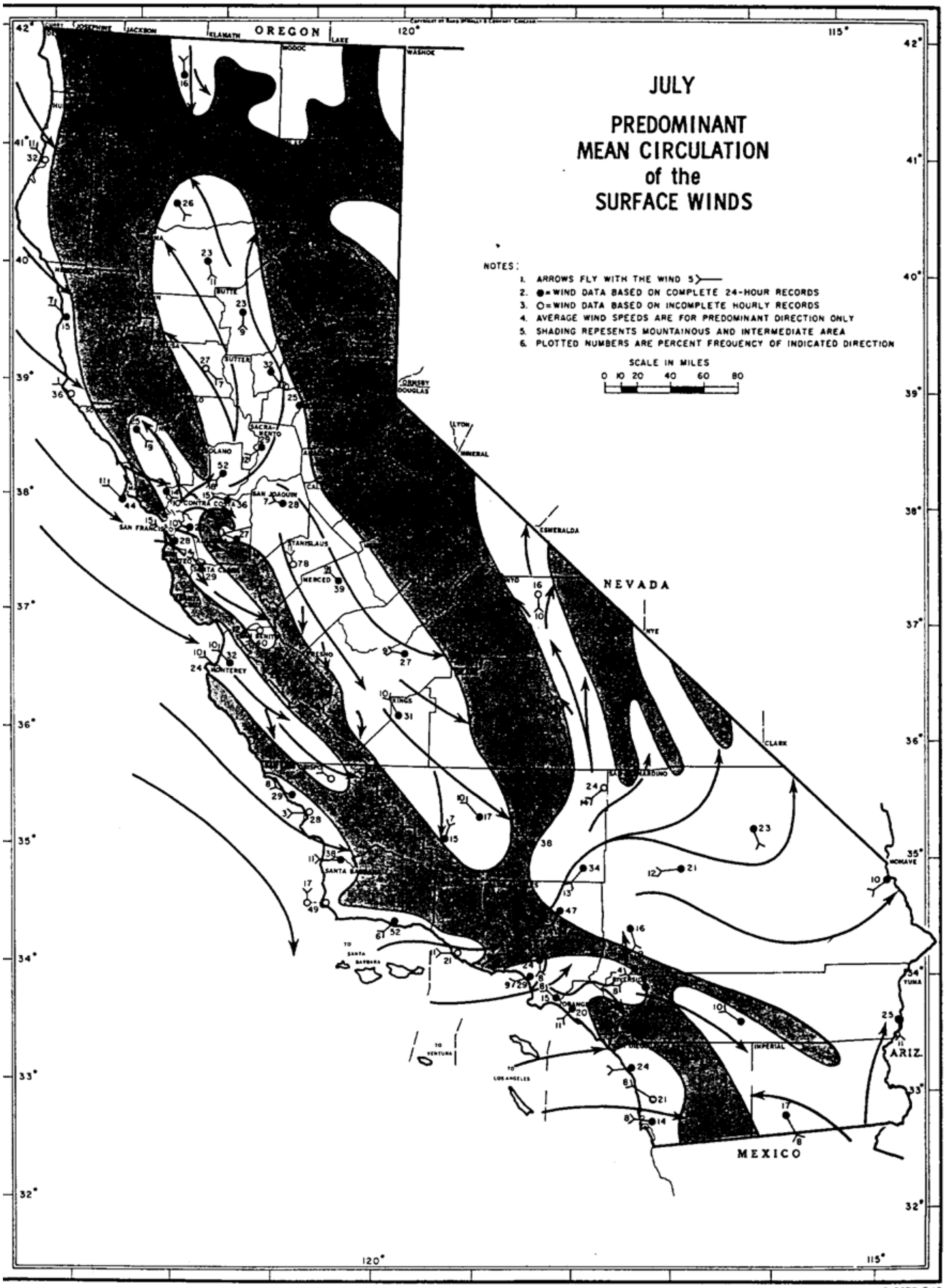
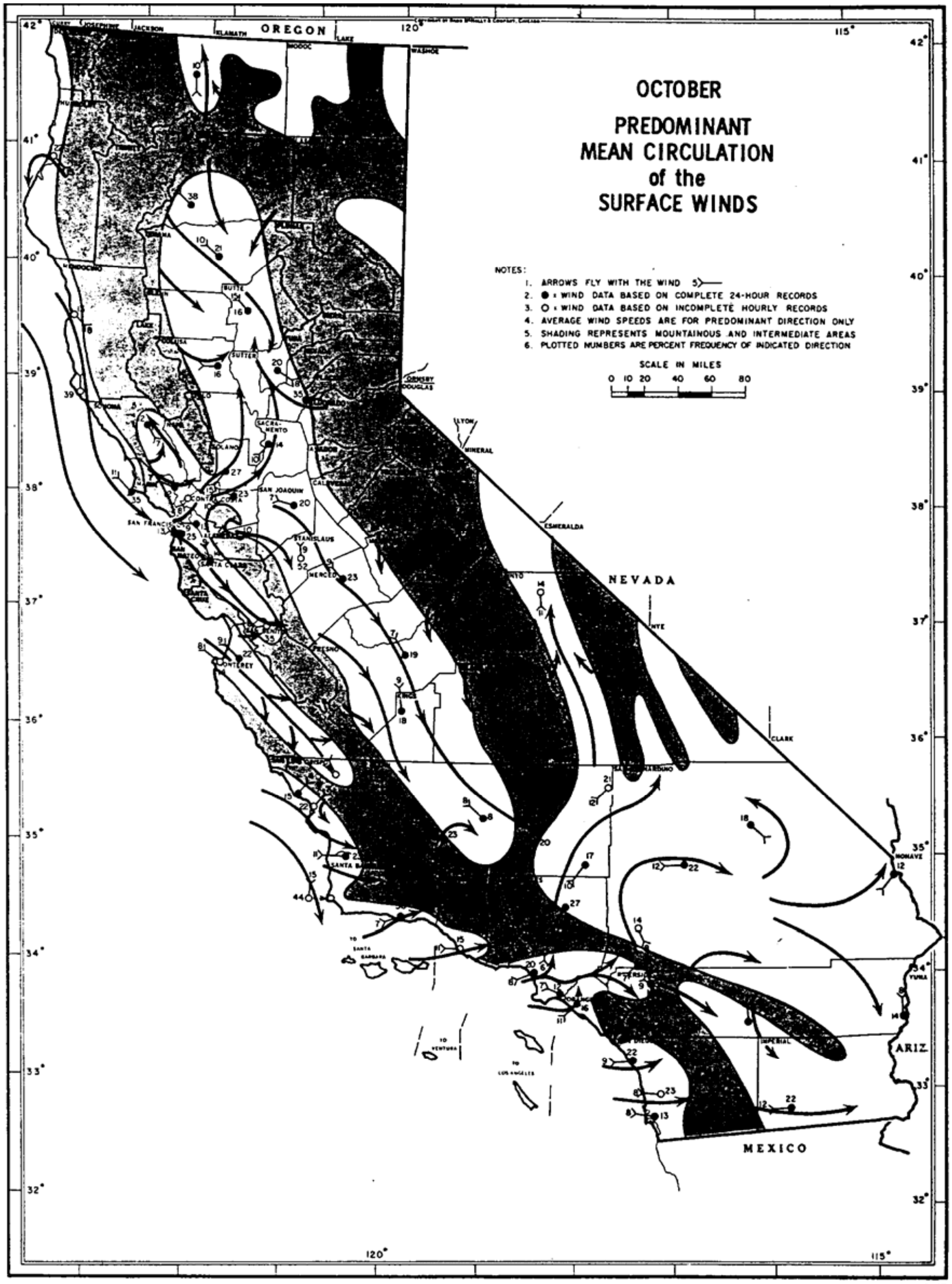


Figure 8.1-4
October Predominant Mean Circulation of the Surface Winds



C-2238-F-13

Figure 8.1-5a
Annual Wind Rose, 1992

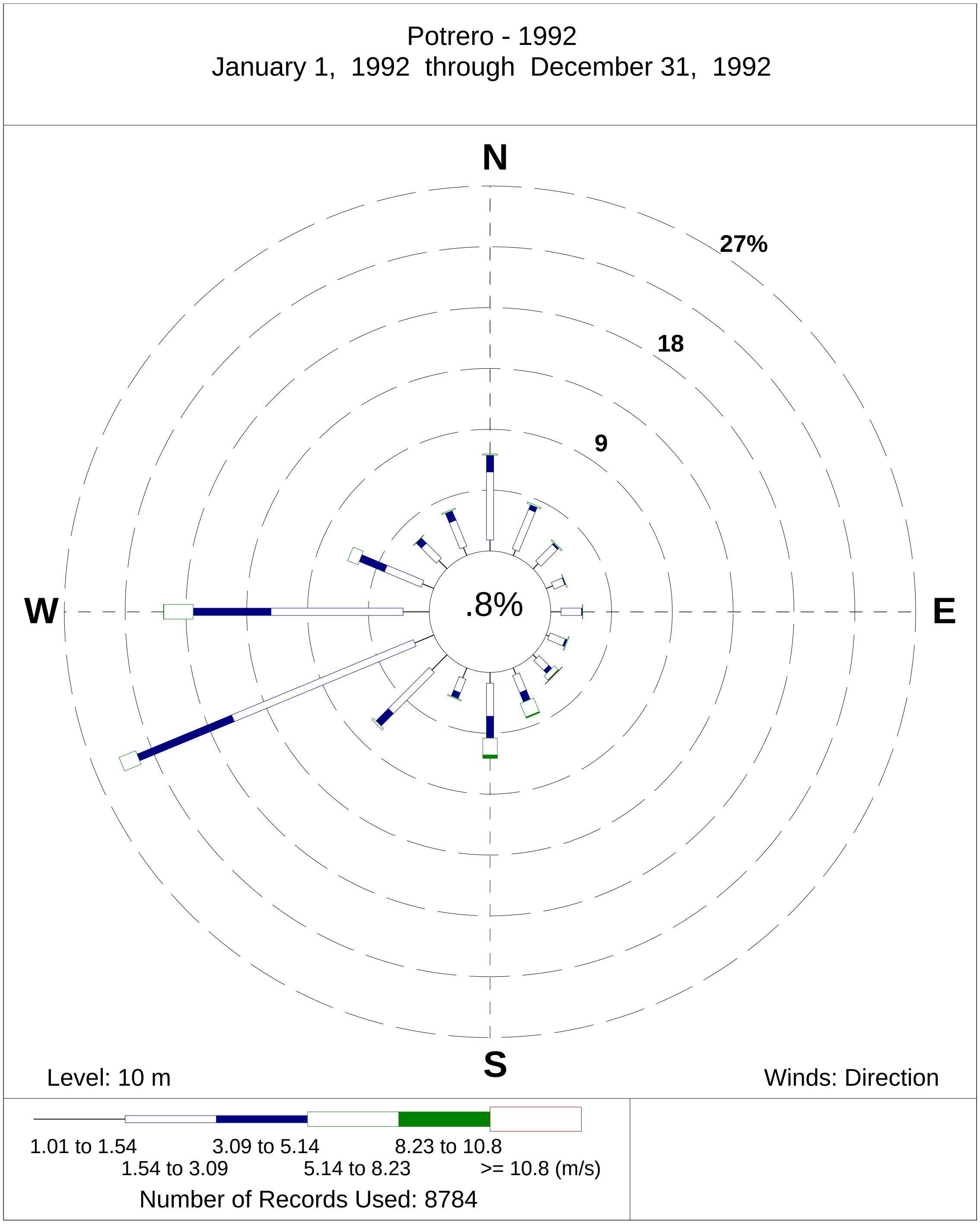


Figure 8.1-5b
Quarterly Wind Rose,
First Quarter 1992

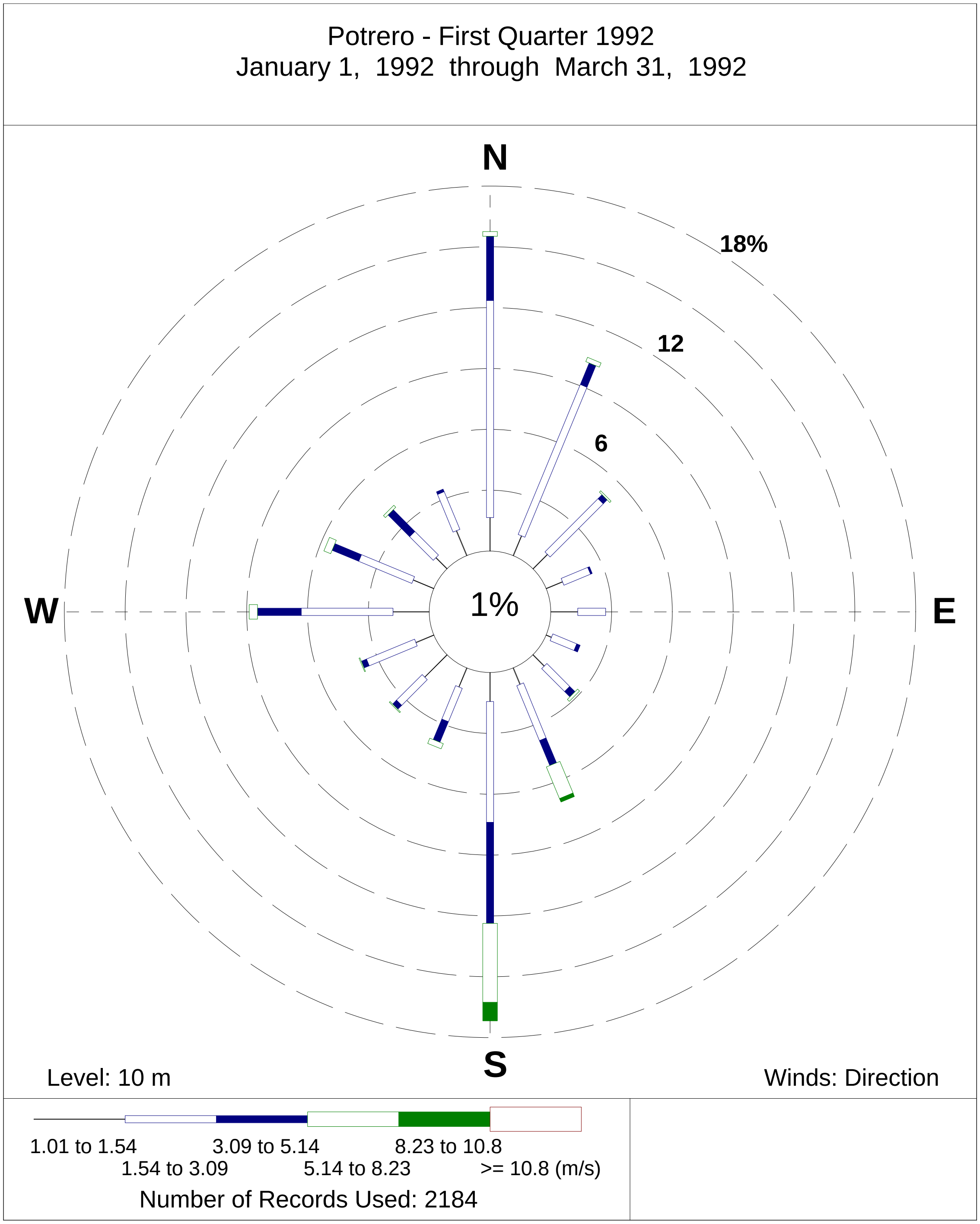


Figure 8.1-5c
Quarterly Wind Rose,
Second Quarter 1992

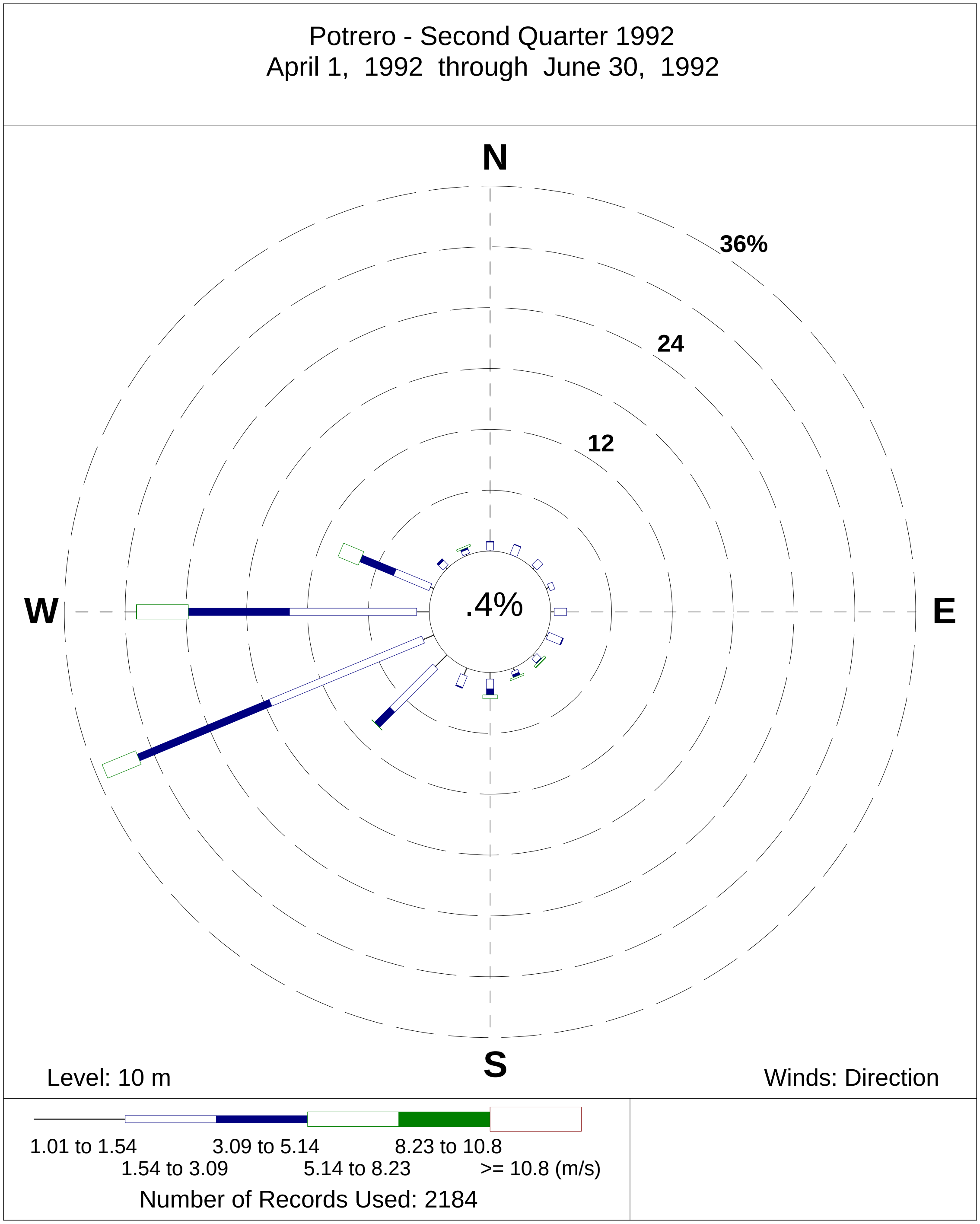


Figure 8.1-5d
Quarterly Wind Rose,
Third Quarter 1992

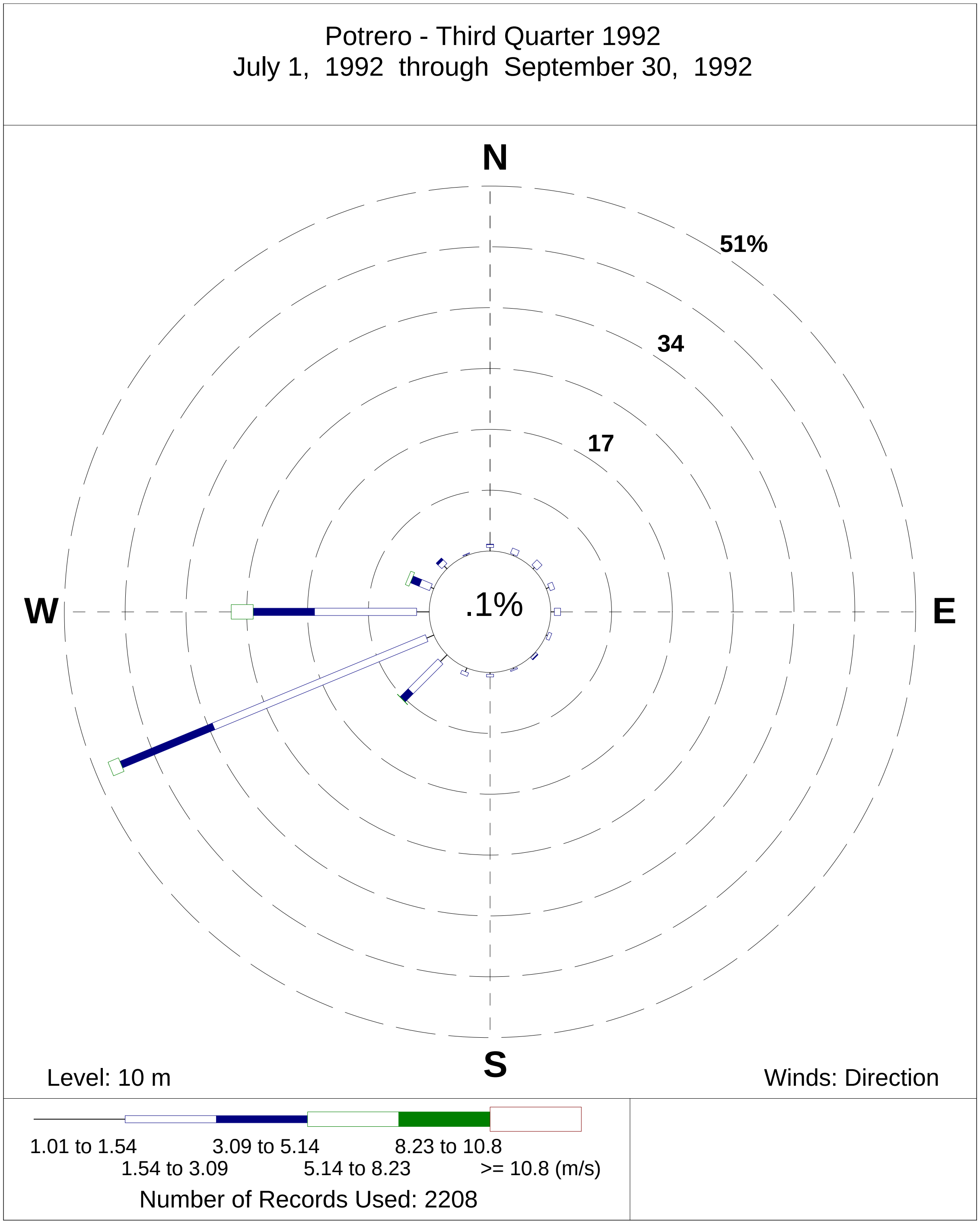


Figure 8.1-5e
Quarterly Wind Rose,
Fourth Quarter 1992

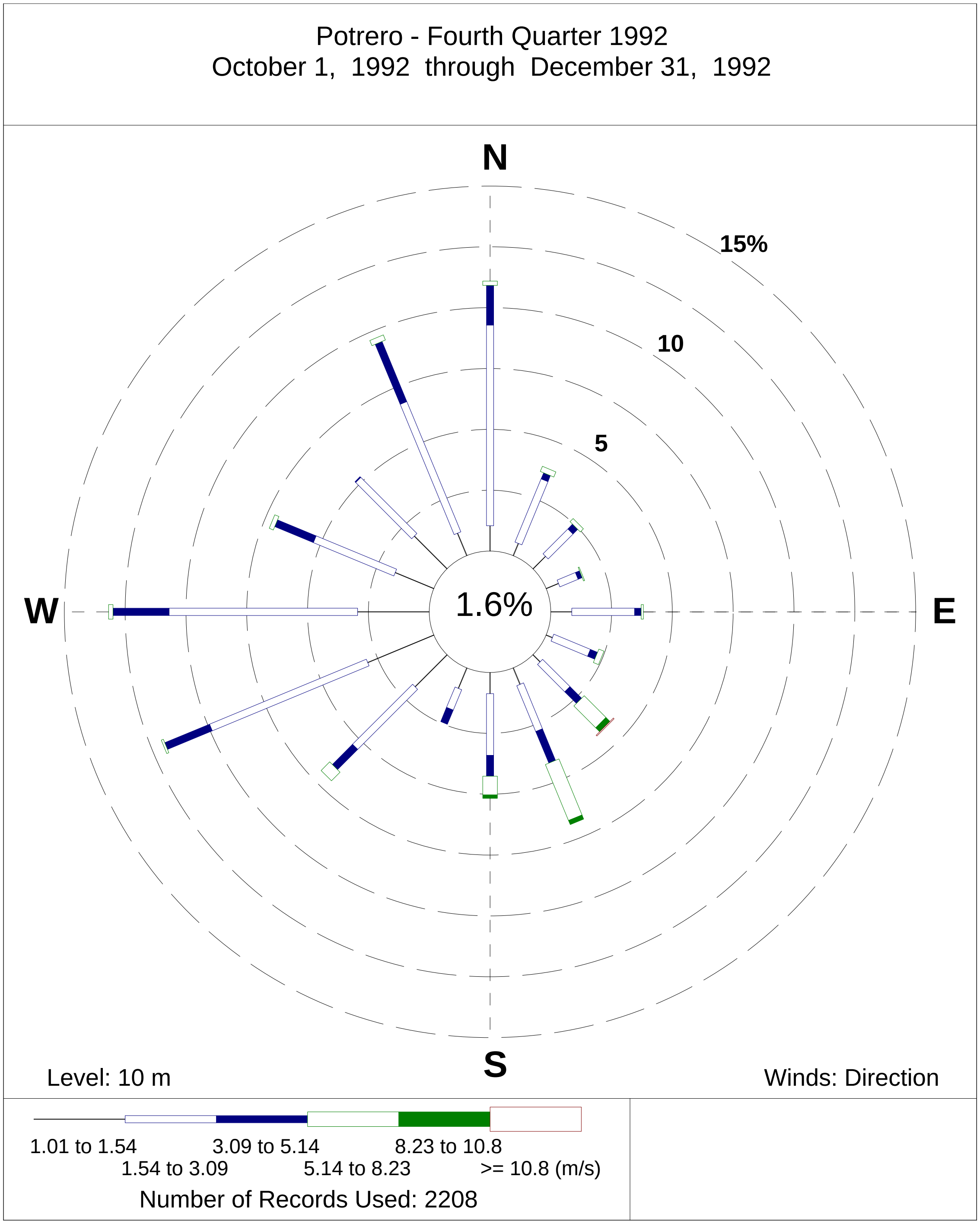
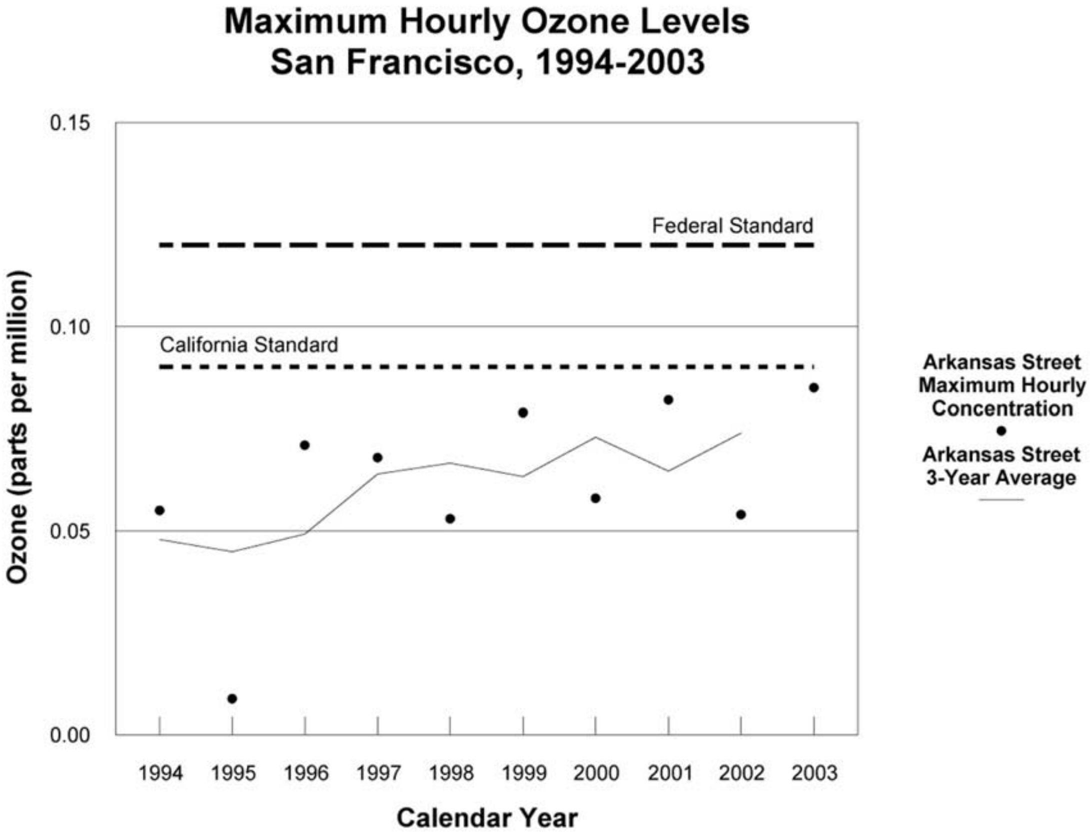
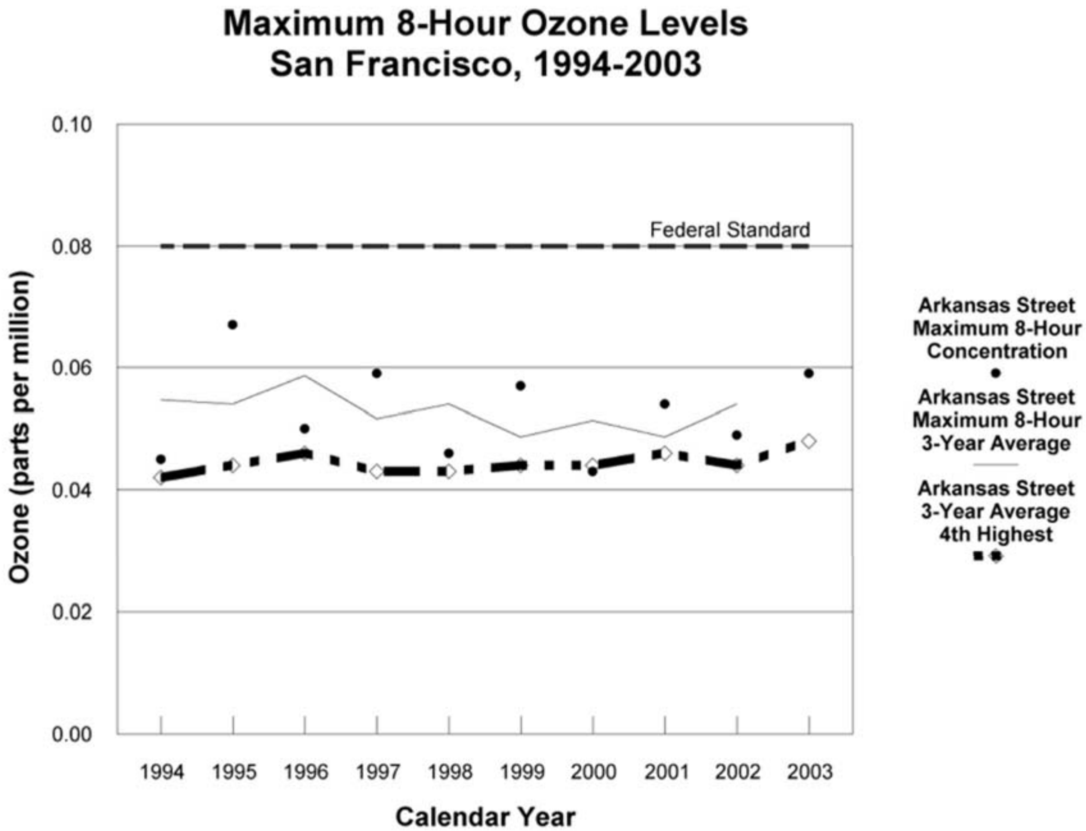


Figure 8.1-6



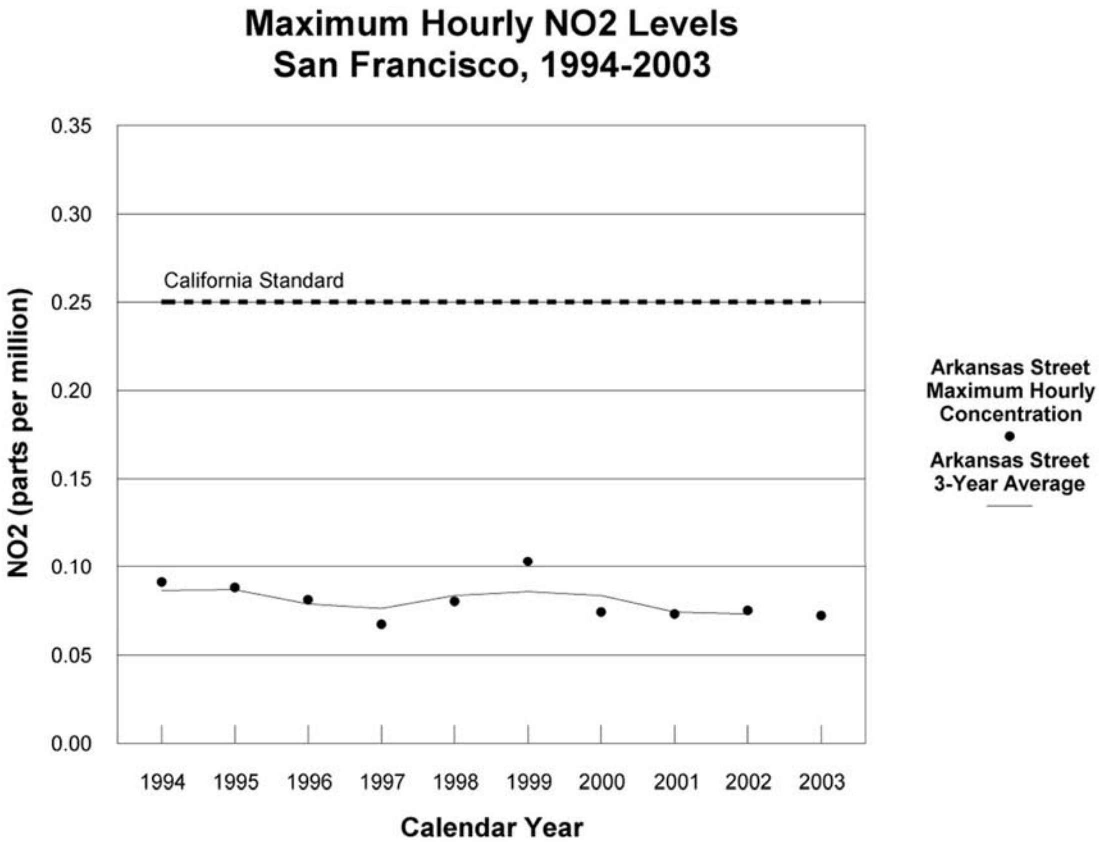
Maximum Hourly Ozone Levels
San Francisco, 1994-2003
0.15
0.10
0.05
0.00
Ozone (parts per million)
Federal Standard
California Standard
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Calendar Year
Arkansas Street
Maximum Hourly
Concentration
Arkansas Street
3-Year Average

Figure 8.1-7



Maximum 8-Hour Ozone Levels
San Francisco, 1994-2003
Federal Standard
Ozone (parts per million)
0.10
0.08
0.06
0.04
0.02
0.00
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Calendar Year
Arkansas Street Maximum 8-Hour Concentration
Arkansas Street Maximum 8-Hour 3-Year Average
Arkansas Street 3-Year Average 4th Highest

Figure 8.1-8



Maximum Hourly NO2 Levels
San Francisco, 1994-2003
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
California Standard
NO2 (parts per million)
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Calendar Year
Arkansas Street
Maximum Hourly
Concentration
Arkansas Street
3-Year Average

Figure 8.1-9

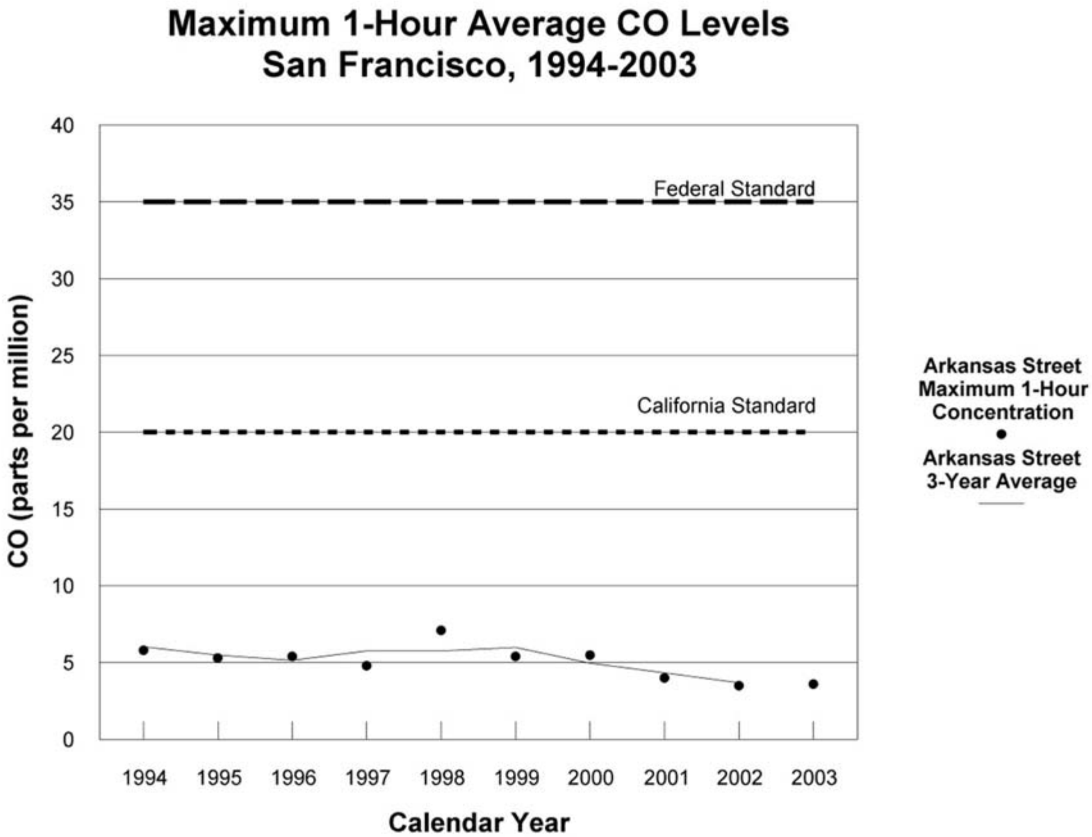

Maximum 1-Hour Average CO Levels
San Francisco, 1994-2003
40
35
30
25
20
15
10
5
0
Federal Standard
California Standard
CO (parts per million)
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Calendar Year
Arkansas Street
Maximum 1-Hour
Concentration
Arkansas Street
3-Year Average

Figure 8.1-10

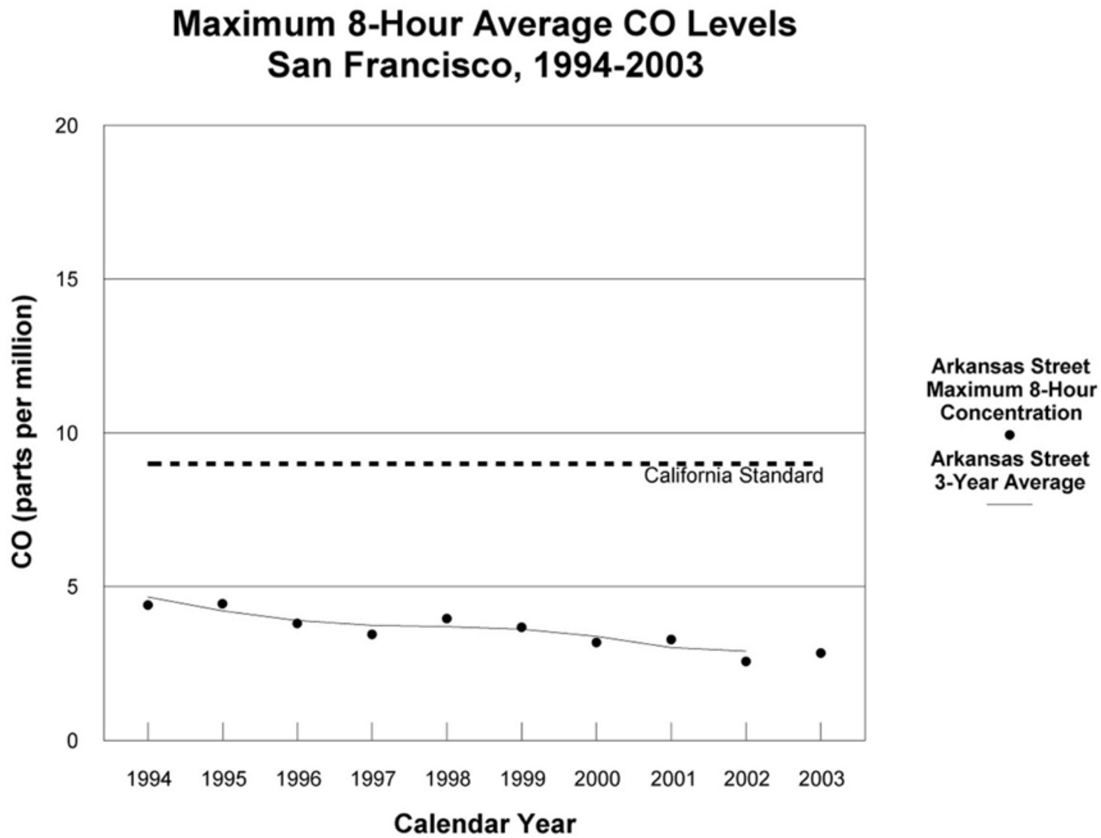

Maximum 8-Hour Average CO Levels
San Francisco, 1994-2003
20
15
10
5
0
CO (parts per million)
California Standard
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Calendar Year
Arkansas Street
Maximum 8-Hour
Concentration
Arkansas Street
3-Year Average

Figure 8.1-11

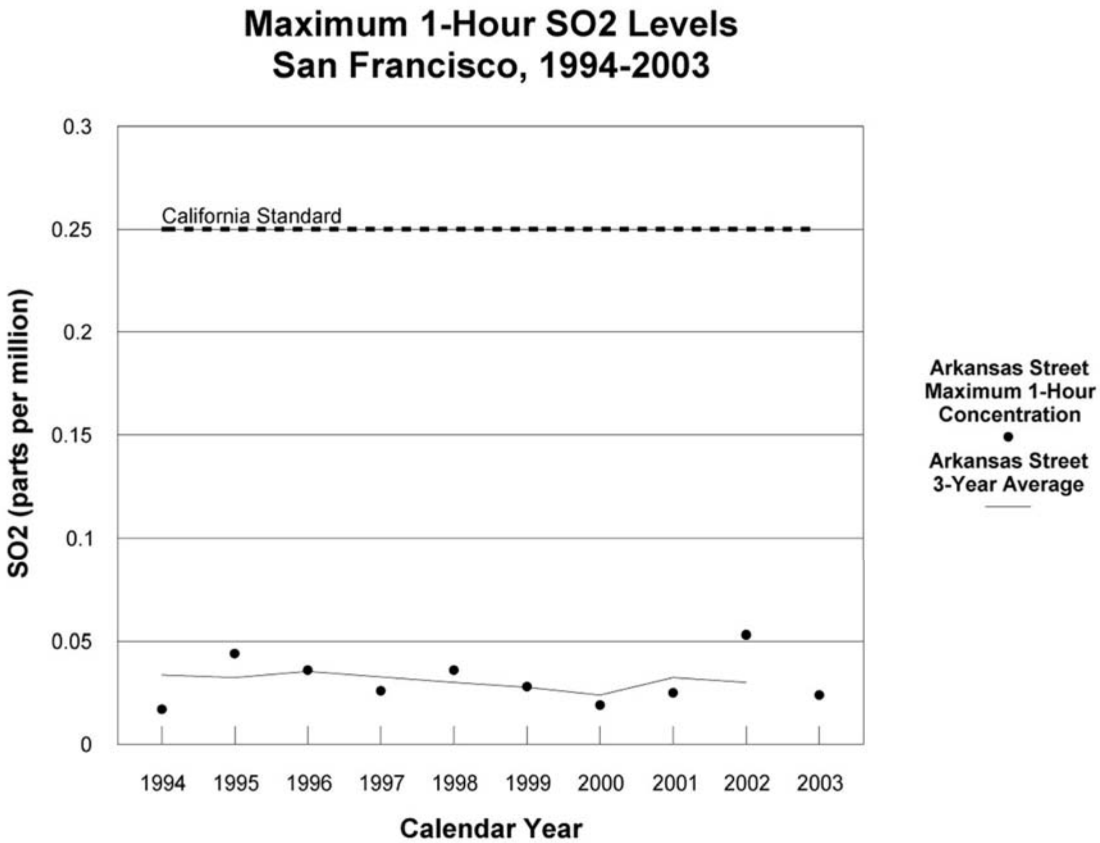

Maximum 1-Hour SO2 Levels
San Francisco, 1994-2003
0.3
0.25
0.2
0.15
0.1
0.05
0
California Standard
SO2 (parts per million)
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Calendar Year
Arkansas Street
Maximum 1-Hour
Concentration
Arkansas Street
3-Year Average

Figure 8.1-12

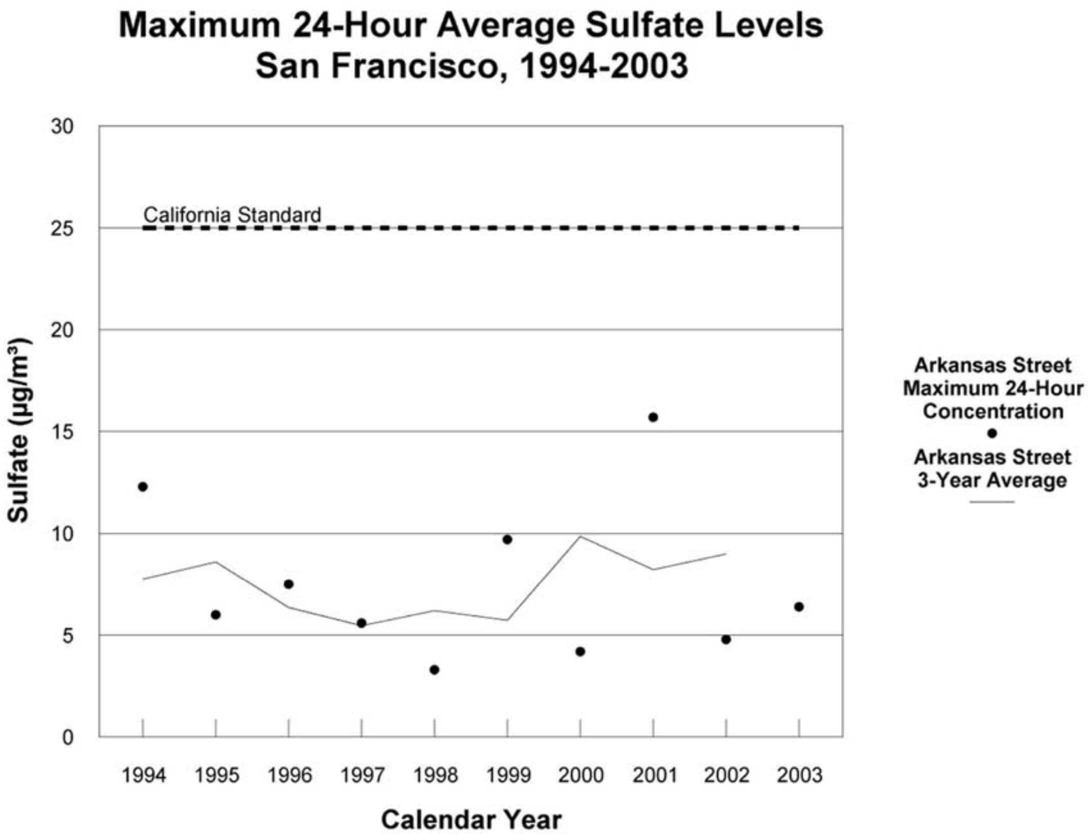

Maximum 24-Hour Average Sulfate Levels
San Francisco, 1994-2003
California Standard
Sulfate (µg/m³)
30
25
20
15
10
5
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Calendar Year
Arkansas Street
Maximum 24-Hour
Concentration
Arkansas Street
3-Year Average

Figure 8.1-13

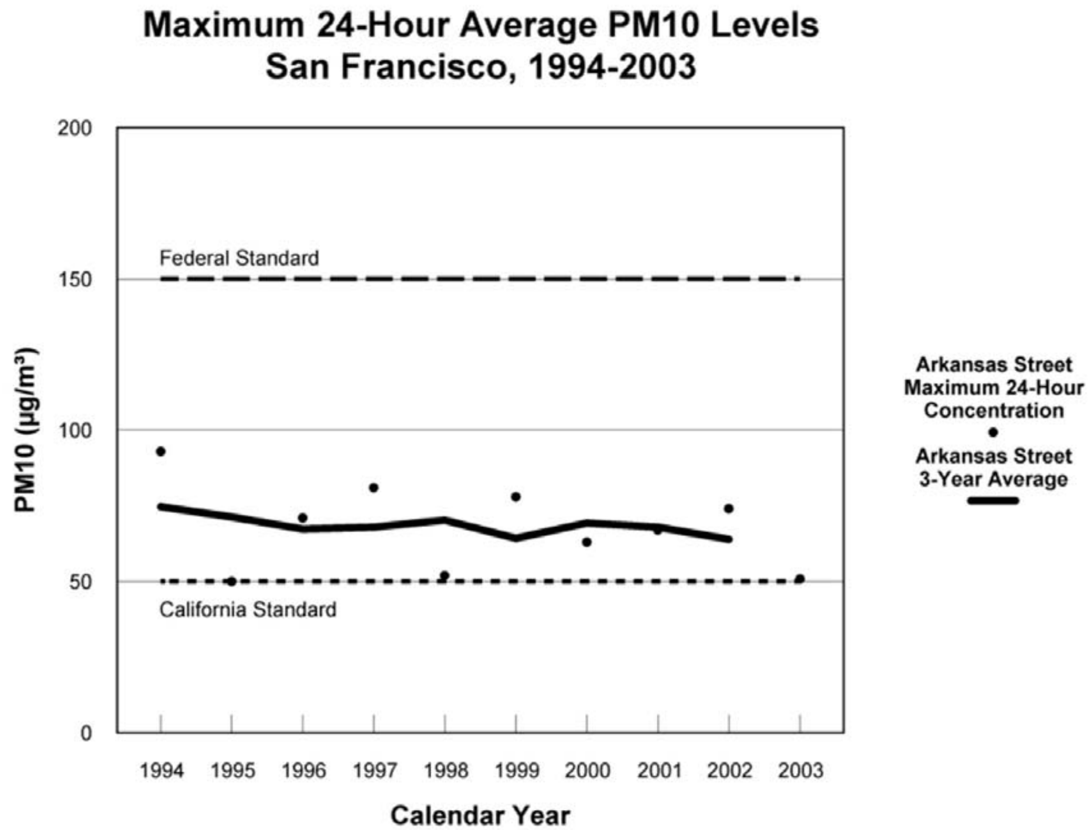

Maximum 24-Hour Average PM10 Levels
San Francisco, 1994-2003
200
150
100
50
0
Federal Standard
California Standard
PM10 (µg/m³)
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Calendar Year
Arkansas Street
Maximum 24-Hour
Concentration
Arkansas Street
3-Year Average

Figure 8.1-14

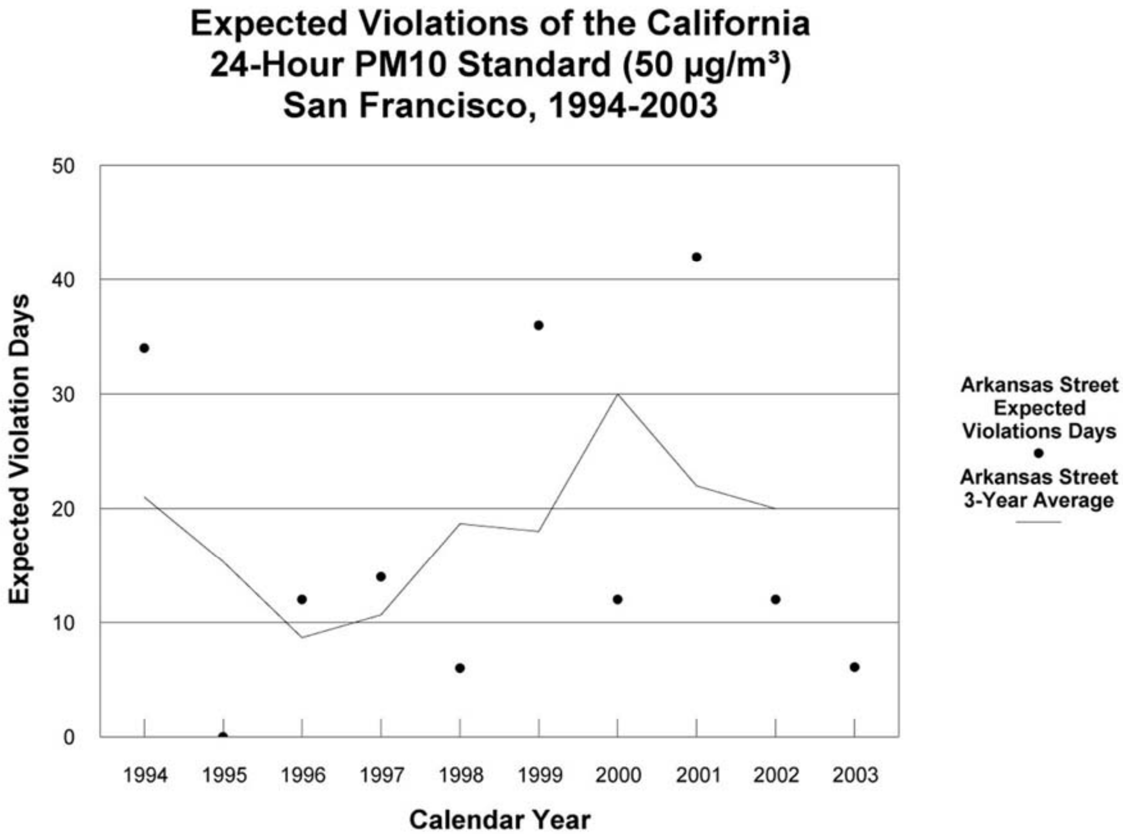

Expected Violations of the California
24-Hour PM10 Standard (50 µg/m³)
San Francisco, 1994-2003
50
40
30
20
10
0
Expected Violation Days
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Calendar Year
Arkansas Street
Expected
Violations Days
Arkansas Street
3-Year Average

Figure 8.1-15

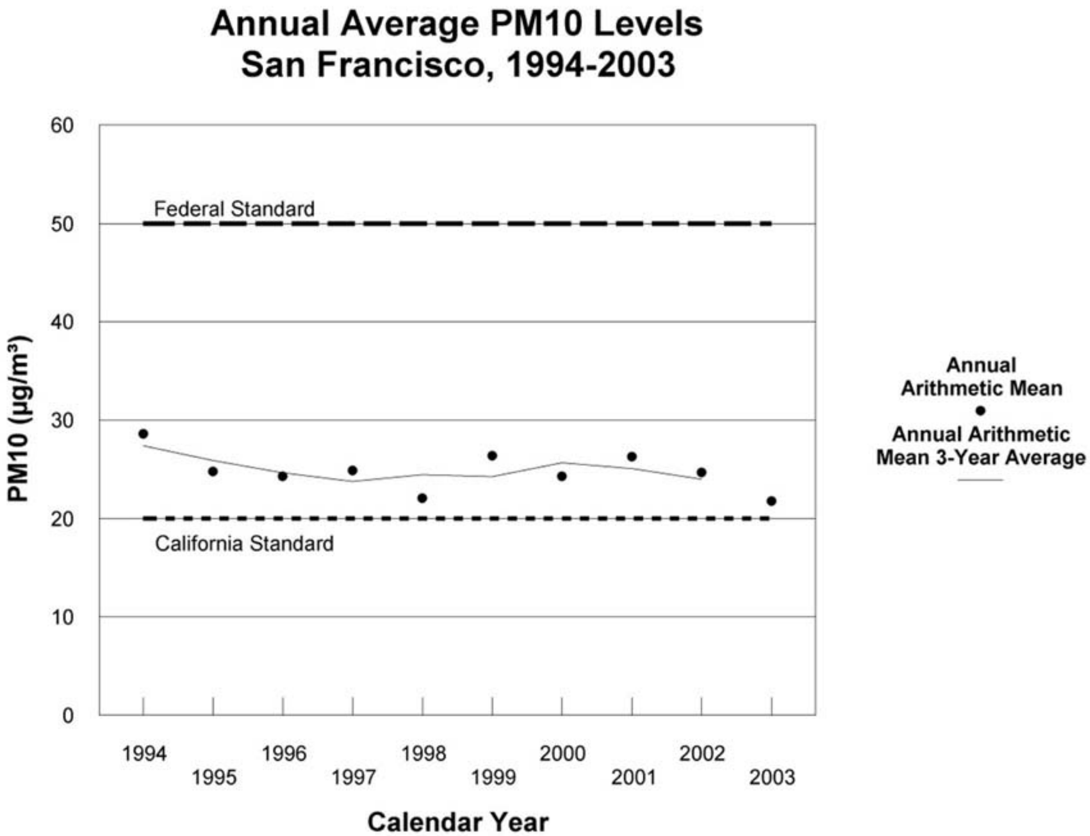
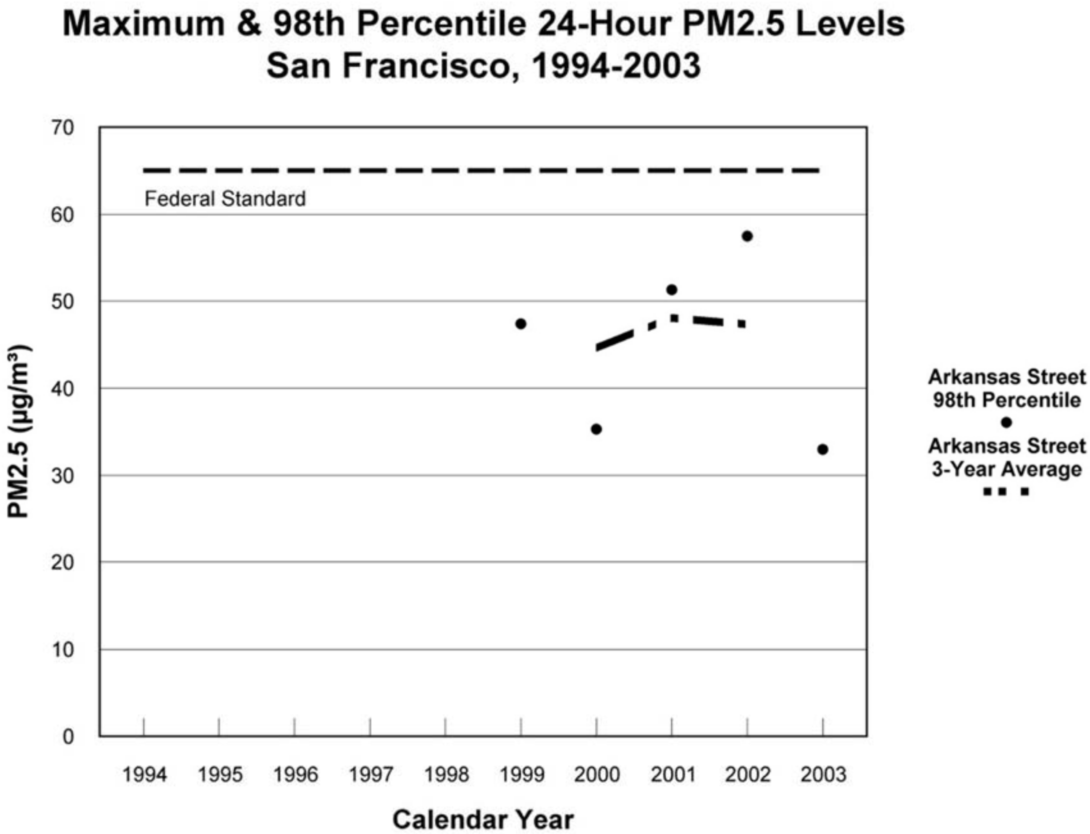

Annual Average PM10 Levels
San Francisco, 1994-2003
60
50
40
30
20
10
0
Federal Standard
California Standard
PM10 (µg/m³)
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Calendar Year
Annual
Arithmetic Mean
Annual Arithmetic
Mean 3-Year Average

Figure 8.1-16


Maximum & 98th Percentile 24-Hour PM2.5 Levels
San Francisco, 1994-2003
70
60
50
40
30
20
10
0
Federal Standard
PM2.5 (µg/m³)
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Calendar Year
Arkansas Street
98th Percentile
Arkansas Street
3-Year Average